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Computer Weekly

Thursday, February 26, 1981

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NEWS BRIEF

Danes win contract

THE contract that went out to tender last summer for a pilot computer network to link seaports around the EEC has been awarded to a consortium led by the Danish firm, I/S Datacentralen 1959. Its tender was chosen from 31 evaluated by Antwerp based EVHA, known in English as the European Ports Data Processing Association.

The winning group has no UK member but includes System Dynamics of Ireland, and Datamont of Italy.

Traffic control

PLESSEY Controls has won an initial £1 million order for microprocessor-based transmission units from the Greater London Council, for its new traffic control system. Using software called Scoot (Split Cycle Offset Optimisation Technique) the new system will enable signals to respond more flexibly to traffic conditions.

No PO monopoly

THE Post Office failed to gain a monopoly on the handling of hard copy produced by electronic mail last week, when an amendment proposing such a monopoly was rejected by the chairman's casting vote in the committee stages of the British Telecommunications Bill. Information Technology Minister Kenneth Baker said that granting a monopoly could potentially damage the development of this important new means of communication.

Trade show

EUROPE is to have its first consumer electronics show, to be held from May 10-13 this year in Nuremberg, Germany. ECES 81 is sponsored by Technology 2000 and organised by Industrial Trade Fairs.

Move to give UK a chance in US viewdata market

by Donald Kennett

THE government is backing a joint venture of Logica and British Telecom which is designed to give the British viewdata and teletext industries a fighting chance in the US against the massive government-controlled and sponsored promotions of the French and Canadian systems.

Speaking at last week's launch of the venture, called British Videotex and Teletext, BVT, Information Technology Minister Kenneth Baker said the aim was to establish a dominant British presence in the US market and make the British voice heard when standards were being made.

The US potential market was enormous, he said.

BVT would make representations to the Federal Communications Commission, co-ordinate participation in exhibitions and trade missions, conduct market research in the US to identify opportunities for UK industry and promote its interests.

At the same time, said Baker, the Department of Industry was setting up an industry contact group to ensure good liaison between BVT and UK companies. Any company able to make a contribution was welcome to join.

Logica chairman Philip Hughes said that setting up BVT answered the many critics who asked why British industry could not get its act together. We had been using teletext and viewdata for years and not talking about it much, while others were talking a lot but could not deliver.

BVT would have offices in New York and Washington and would operate as part of Logica's US subsidiary, said Hughes. It would market Prestel systems based on GEC computers, would act as a contractor to the DoI in promoting the British image in technology in the US and would sell a range of computer-based graphics tools which were developed for television by Logica and the BBC and which had already been sold to the German and Austrian broadcasting authorities.

Hughes stressed the importance of handling the two streams of viewdata and teletext together, particularly in aiming at the myriad US cable television companies which were currently going through a phase of tremendous expansion.

BVT was concentrating on public service viewdata, while other UK companies were already selling into the market for in-house systems. One advantage the UK had over its rivals came from the diversity of companies active in the market, said Hughes.

British Telecom managing director Peter Benton said that over 500 subscribers were coming on to Prestel every month in the UK, and with 9,000 terminals now attached it was the largest information service in the world.

MSA to go public soon

by Claire Gooding

APPLICATIONS software supplier Management Science America is preparing to go public, following in the footsteps of Apple, whose shares rocketed after public issue.

MSA has already filed a registration statement with the US Securities and Exchange Commission and the prospectus is now available to the investment community. The public offering is expected to be 1,500,000 shares of common stock, about two thirds coming from the company itself and the rest from private shareholders.

The company has issued a statement saying that the proceeds of the sale will go towards paying off debts, furnishing working capital and buying new companies, products and equipment, but MSA is not allowed to reveal more under US regulations which forbid prospective public companies to affect the price of shares by self-advertisement.

It makes sense for the firm to expand by acquiring new companies and with them new products, as MSA has done in the past.

Last autumn MSA president John Imlay revealed that the company was planning to win its way into the "office of the future" market by acquiring small specialist firms in order to produce complete systems rather than just hardware.

A spokesman from the company handling the underwriting of the MSA issue explained "MSA is interested in raising additional capital to expand into new product areas, as well as wanting some liquidity for its owners and spreading out the ownership."

ICL crisis nears its climax

● From front page

were arranged by the company alone.

So far the meetings also seem to be swinging investors behind the company. At least two sources say the way is being cleared for a restructuring of the the company's balance sheet, possibly via a buyout of leasing interests and a conversion of Export Credits Guarantees Department credits into assets in the form of a revolving credit.

According to some sources, ICL appears to be applying intense pressure on large users within the financial institutions, like the Prudential insurance group, to rally behind the company to put up some cash to ease the pressures on it. If this happens the government (itself a large user) may come forward with taxpayers' money.

A meeting scheduled for next week between ICL and its main bankers, Barclays, Midland, Citibank and Dresdener, appears to be going ahead, as previously published in two Sunday newspapers, although ICL will neither confirm nor deny this. It also appears that the statement put out by Barclays after the annual meeting, to the effect that it and the other banks were being kept informed of the company's position, was made on behalf of Barclays alone and not of the others.

The company's share price continues to hover between about 42p and 37p, reflecting continued unease and a recent Sunday newspaper report of the growing uncertainty among ICL users.

On the foreign front ICL has denied industry reports that deputy managing director for worldwide marketing Peter Ellis was in Japan for 11 days last year, along with a high-powered team of company officials. Ellis has not been out of the country for over a year, according to the company.

Meanwhile the chairman, finance director and corporate communications director have been wearing out the City pavements together, without one obvious companion — managing director Dr Chris Wilson. At the annual meeting Wilson answered only one minor question and was not at the Press conference shortly afterwards. He has attendded none of the meetings with stockbrokers so far disclosed and is not known to (have attended any of the arranged lunches either.

Some City sources were surprised not to see him there under the circumstances, though the company points out that meetings in the City are normally handled by secretariat and finance.

Jacquard dealership

by Paul Fisher

COMPLETE Word Processors is planning to take up the A. M. Jacquard distributorship which was vacated by the collapse of Hallmark Business Systems. CWP offered sanctuary to Hallmark while the receiver was in its Putney premises.

Hallmark Business Systems went into liquidation on February 3 but re-opened shortly afterwards as Hallmark Computers. Five former Hallmark employees, plus ex-managing director Tony Couke, will be working in CWP's small business system operation.

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Challenge by church

● From front page

prescribed under the French privacy Act. Interpol refused, saying it was exempt from the Act.

The victim of the error was Georges Andreu, president of the Church of Scientology in France. As a result the Church of Scientology in the UK is pressing the Home Office and the Commons Home Affairs Committee for Britain's dealing with Interpol to be suspended until its legal status is clarified.

Thus data on British subjects should not for the present be passed to Interpol, the Church is insisting.

Interpol was an informal association of police forces and was not set up under any statute, Peter Thompson of the Church explained to Computer Weekly. Thus it could not be made answerable to any authority such as Parliament, but at the same time it was trying to assert privileges such as exemption from privacy laws, and this was unacceptable, Thompson said.

4-Mbit bubble

INTEL Magnetics expects to have working four-megabit bubble memories and an associated kit by the middle of 1982.

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NEWS BRIEF

Sinclair at a micro price

ONLY a fortnight after Clive Sinclair announced his revolutionary flat-screen TV, he has unveiled a new personal computer said to have "a significantly higher specification than the £99 ZX80 but at a substantially reduced price".

It goes on show for the first time at next week's Microsystems '81 at the Wembley Conference Centre, with a new low-cost printer and support software. Sinclair Research's ZX80 personal computer was launched in September last year and is now selling at a rate of 10,000 units a month.

Backing ICL

ICL director Dr J. Ritmeester van de Kamp has bought 10,000 company shares at 41p each. Explaining the deal, an ICL spokesman said van de Kamp felt confident about company prospects and said shares had probably reached their lowest ebb. "It's a good investment at this kind of price," he added. Last year, ICL shares touched a 191p high.

IBM price cut

IBM has announced purchase price cuts of up to 25 per cent on the processor for the System 38, depending on the size of the system. Rental charges remain unchanged.

Nexos denies

NEXOS and British Telecom are refusing to comment on reports that they are planning a joint-venture telephone-answering service based on the Delta processor made by Exxon subsidiary Delphi in the US, for which Nexos has UK marketing rights.

New language

DBL 2.0, a competitor to DIBOL, Digital Equipment's own language for PDP-11s, will be launched by Bristol software house Zenith. According to Zenith, DBL 2.0 is compatible with existing application programs in DIBOL 2 and DBL 1.0.

Ferranti US buy

THROUGH its Cetec graphics subsidiary, Ferranti has taken a minority shareholding in California based Vector-General, a leading American manufacturer of computer graphics and computer-aided design equipment.

Pet to get Comal

COMAL, the Danish-developed language billed as a successor to Basic in education, is to become an approved language for the Commodore Pet. Commodore is a leading contender in the education field, and as yet Comal is only available on scarce RC Piccolos.

Bernard Panton of Telecomputing found the company's assets frozen in court action by California supplier ECS Microsystems

Raid 'freezes' Telecomputing

by Keith Jones

THE assets of Oxford software house, Telecomputing, were effectively frozen last week as a result of drastic legal action by ECS Microsystems, the California firm that supplies the hardware for what is now a major Telecomputing product, the TECS 4500 microcomputer.

Telecomputing is attempting to take a stake of around 50% in ECS Microsystems by buying ECS Holdings Pty of Australia. The ECS kit was originally developed in Australia and the design rights still reside there, but the California firm is controlled by minority US interests.

Solicitors representing ECS raided four offices of Telecomputing in the UK last week on an order issued in the High Court by Mr Justice Mocatta giving them the right to inspect all documents relating to Telecomputing's assets.

The judge also ordered that Telecomputing assets worth $1.4 million should remain in the UK.

No Telecomputing representative was present in court when Mr Justice Mocatta's order was made. But later that day Telecomputing chairman Bernard Panton put his case through counsel to Mr Justice Parker, who then ordered the solicitors to leave Telecomputing's premises.

Faced with a financial crisis caused by the freezing of its assets, Panton immediately initiated proceedings that led to the majority of Telecomputing's funds being unfrozen by the end of last week.

Panton was still in court earlier this week to complete the action and to seek damages.

The justification given by ECS for its action was Telecomputing's decision last December to withhold $450,000 of payments from ECS because of what Telecomputing considered to be defects in the goods shipped by the California firm.

The Oxford firm's adviser, solicitor Martin Hodson, said that Telecomputing obtained a court order in California on February 26 forbidding ECS from pursuing legal proceedings outside California and specifically in London.

This action followed the filing on February 20 of a $12 million action by Telecomputing in California against ECS for allegedly supplying faulty equipment. It also charged the US firm with repudiating Telecomputing's exclusive rights to sell the kit in Europe and defrauding Telecomputing by conspiring to deceive the Oxford firm that it would have the European exclusive rights.

Martin Hodson named Hytec of

● Turn to page 5

Senior managers remove cheques worth £9 million

NHS national strike looms

by Rory Johnston

A FULL-SCALE strike of computer staff at North West Regional Health Authority has developed out of limited action in pursuit of a pay claim, following a management "raid" to seize £9 million worth of cheques from the computer being held back by staff.

All 45 members of NALGO, in the computer department of the authority, including operators, programmers and analysts, are on strike, and a nationwide strike of NHS computer staff is now looming.

For the last six weeks NHS computer operators have been refusing to co-operate in the operation of accounting systems, in pursuit of a claim for parity with outside computer staff. Cheques being printed by the North West computer were being stockpiled by the operators, until last week two senior managers went into the machine area and removed the cheques, worth £9 million.

Efforts to distribute these cheques to their payees have been largely thwarted by blacking by other clerical staff.

Other computer staff action at West Midlands Regional Health Authority has piled up over £1½ million in unpaid bills, mostly to building contractors and traders who supply goods on a regional basis. The sanctions have not greatly affected the smaller area health authorities, most of which pay their bills manually.

CIVIL service industrial action next week could have a serious effect both on the strategically sensitive Government Communications Headquarters at Cheltenham and on tax revenue collection, cutting the government's cash flow. See Page 3.

National talks between NALGO and the employers are now nearly deadlocked over the question of where further money could come from. The conciliation service ACAS is trying to get talks moving again.

The employers have suggested that the computer staffs' increase should be part of the increase provided for all Health Service staff when and if that gets settled.

NALGO finds this "totally unacceptable", a spokesman told Computer Weekly, since the whole point was that computer salaries in the NHS were lower than outside and therefore they had to rise higher than other groups in the Health Service.

An unfortunate side-effect of the current industrial action is that union members' own salaries are being stopped. This had to be accepted, the spokesman said.

Bendix denies bid for Burroughs

by Kevin Cahill

BENDIX, the Michigan based aerospace to car parts conglomerate, has strenuously denied that the resignation of two current Burroughs directors, Alan E. Schwartz and Paul Mirabito, from the Bendix board, has anything to do with a bid for Burroughs, the second biggest computer company in the world.

Schwartz and Mirabito tendered their resignations last Friday morning, February 27, with Harry B. Cunningham, a former Burroughs director, who has been on the Bendix board for 15 years. At the same time Coy G. Eklund, a director of Bendix and Burroughs, has resigned from the Burroughs board while retaining his Bendix directorship.

Commenting on the resignations William M. Agee, chairman of Bendix, said that he accepted the resignations "to avoid the possibility of any conflict of interest that may arise as a result of the implementation of our acquisition strategy."

Bendix, which had sales last year of over $4 billion, has recently sold off a series of forest product and natural resource companies and raised over $800 million. Part of this money has already been spent on buying back four million Bendix shares, but over $400 mil-

● Turn to page 5

Venture fund cash flows

by Brandon Gamester

FIRST cash support from the Anglo American Venture Fund has been awarded to a new company, Positron Computers, which will receive £265,000 to aid development of a range of microcomputers.

The Anglo American Venture Fund, headed by US financier Jack Melchor, was set up last November under the aegis of the National Enterprise Board. Its pot of £2 million is to provide "seedcorn" investment funds to fledgling, new technology ventures in the North of England.

Since November 40 to 50 applications have been received, 20 of which have been considered serious enough for investigation.

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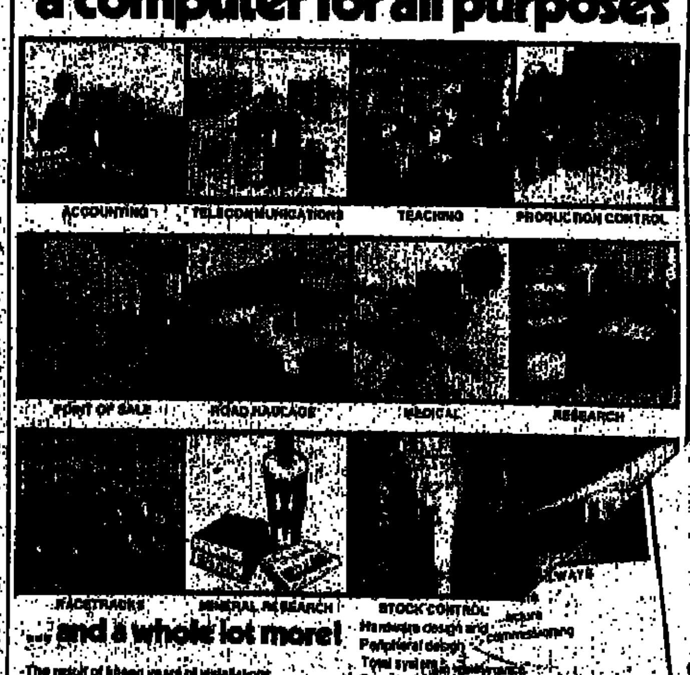

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Both sides tight-lipped over amount of settlement

Telecomputing ends action against ICL

by Claire Gooding

OXFORD systems house Telecomputing has settled its long-standing quarrel with ICL out of court, with ICL paying the firm an amount which is thought to be in the region of £500,000.

Telecomputing's original claim against ICL was for £2.5 million, later stepped up to £16 million, based on the amount that the company says it has lost through ICL's alleged ineffective marketing of the Telecomputing teleprocessing monitor TPS.

"I wouldn't say we've completely buried the hatchet," said solicitor Martin Hodson, Telecomputing's advisor. "Let's say we've put away the sabres, but the wounds will take some time to heal. We've been sworn to secrecy as to the actual amount they're paying us, but it's by no means insignificant."

However, he did admit that the estimate of £500,000 quoted in the Press was "a pretty good guess."

ICL was also tight-lipped about the amount. "We've reached an amicable agreement, and we're quite happy with it," said an ICL spokeswoman. "Sorry we can't be more helpful, but we've agreed with Telecomputing not to give any details and we can't comment."

Telecomputing chairman Bernard Panton told Computer Weekly that despite protracted legal costs the company had made a profit on the settlement. "It's a tremendous chance for a new beginning, that is to say, we've been going along steadily, and suddenly we have a massive great cash inflow. It means we'll have a large amount of money to spend on machines."

The settlement is likely to be a relief to both companies and the entire ICL community. "Whatever has come out of this, the quarrel has done no good to ICL," commented Ken Wattam of Gresham Computer Services, another systems house which supplies ICL-compatible TP systems. "It's meant suspicion and distrust between salesmen and potential users, and if the settlement puts an end to that it can only be good for the entire ICL user community."

The settlement has led to speculation that ICL might even take up the marketing agreement on TPS again, despite strenuous efforts to persuade users that ICL's own TP options can now cope with demand.

But some industry sources feel that TPS itself is an outdated concept, which is in any case nearing the end of the road as the large system business begins to dry up. "Telecomputing caught the market cold with TPS," commented one ICL-watcher, "But users have been spoilt since then, and anyone selling TP options now must be oriented towards the market as it stands."

Lowe . . . concerned that ACT should be seen to protect the US owners of Visicalc . . . against alleged illegal copying.

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Fee back if not delighted

by Keith Jones

IBM System 3 users attending a consultancy briefing in London next week will get back their £429 attendance fee if they replace their machine within a year with a system not recommended by the briefing session.

Called Beyond System 3, the event is the first to be staged by Xephon Technology Transfer, the Maidenhead conference firm set up last year by Chris Bunyon, former director of the liquidated Infotech.

Xephon events will be aimed mainly at IBM users, and money-back guarantees will be a feature of future seminars where appropriate. For example, the next event, called Cutting Costs with IBM, comes with a "cost saving or refund" guarantee from Xephon. Running from April 6 to 8, the event is aimed at users of IBM DPD systems.

The System 3 session, aimed at GSD users, is being held at the Portman Hotel from March 11/13.

ACT to press ahead with copyright test

by Keith Jones

THE SOFTWARE copyright action taken by ACT Microsoft against David Bolton is not over after all, according to ACT's managing director David Lowe.

Lowe said that he might still apply for an injunction stopping Bolton selling his Visicalc Backup product to Apple users, despite anxieties expressed by ACT counsel Alistair Kelman about the company going to court without being backed by suitable legislation.

Lowe is concerned that ACT should be seen as protecting the US owners of Visicalc, Personal Software Inc, against alleged illegal copying of its product by Visicalc Backup.

He remarked, "If they see we are dropping out and not backing them, they'll melt away into the night."

Lowe explained that Mr Justice Whitford refused to hear ACT's original application for an injunction on the technical grounds that ACT did not have any legal standing because it was not the primary Visicalc copyright holder.

But Lowe said that he visited PSI in California subsequently and obtained written authority to pursue the case, putting him in a position to try again for an injunction.

ACT has already spent "several thousands" on legal fees and could happily afford to spend £40,000 on the case, Lowe said, but he admitted that a full trial following on from the injunction could prove very expensive.

At the same time, ACT is using commercial means to inhibit sales of Bolton's Backup product for the financial planning package.

ACT is drawing the users' attention to the fact that they can obtain one backup copy, either directly from ACT or from Microsense or another authorised dealer, for £13.50. This is the cost price of the package as landed in the UK and is several pounds less than Visicalc Backup.

The first copy of Visicalc costs the end user £125, ACT selling the package to dealers for £75. Lowe said that the seemingly high mark-up was necessary to cover documentation and support.

Availability of the £13.50 backup copy is now advertised prominently on a sticky label attached to the holder of the Visicalc diskette.

Whitehall tries out hardware

by Rory Johnston

AUTOMATION in government offices is taking some more small steps forward with the establishment of an experimental local network in which civil servants use keyboards and screens.

A Zynar network with 12 Apple personal computers will come into use this month, the environment chosen being the presumably computer-friendly one of the Central Computer and Telecommunications Agency.

At the same time the CCTA has released results from the second phase of its detailed study into the cost-effectiveness of word processors. The overall conclusion of this is that standalone word processors can pay for themselves in producing multiple drafts of reports, but not in one-off typing.

The earlier report, published in 1979 and dealing with shared-logic systems, provoked controversy by asserting that for the general run of work in a normal typing pool they were not cost effective and therefore a waste of money.

Productivity improvements obtained then varied from 40% to 200%. With the standalones, the range found was 50% to 100%.

Five different makes of equipment were used, unlike the earlier experiment where there was only one. The machines were Lexisan, Rank Xerox 850, Amtext 4[illegible], IBM System 6 and Data Recall Diamond. No attempt was made to compare the machines systematically.

The Zynar system, one of the first low-cost local networks to come on the market and designed exclusively for the Apple, will provide a message service including shared disc storage.

Civil servants using it will include an assistant secretary, a fairly senior rank, and it is intended that they should do their own typing.

Where an official has a secretary, that secretary will also have a terminal, and how the two will interact and share the work is one of the unknowns that the CCTA researchers hope to explore.

Other studies to come will be on electronic typewriters and on the broad front of how offices work and the creation and flow of documents.

A controversial conclusion of the word processing report is that the initial typing of documents is no faster on a word processor than on an electric typewriter, despite automatic carriage returns and easy correction.

The report is available free from the CCTA at 157 Millbank, London SW1P 4RT.

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Editor Simon Timm 01-661 3122
Deputy Editor Brandon Gamester 01-661 3124
Associate Editors Keith Jones, Rory Johnston, Kevin Gandy [illegible]

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Unions to halt £850 million a week in tax payments

by Nicholas Enticknap

GOVERNMENT computer systems used for processing tax payments of £850 million a week are likely to be brought to a standstill next week, following a decision by the Council of Civil Service Unions to take industrial action over its pay claim. This would cost the government well over £1 million a week in lost interest payments, and would severely affect its cash flow.

This prospect has arisen following the failure of pay negotiations last week. The government had raised its initial six per cent offer to seven per cent, but this was not acceptable to the Council, which represents nine Civil Service white collar unions and is claiming 15 per cent.

The decision to take industrial action was made during a special council meeting last Thursday.

In a statement issued after this meeting, the Council said there would be a one-day strike by all 520,000 members of the nine unions next Monday (March 9), followed by a "number of selected strikes involving relatively small numbers, designed to have a maximum impact on the government".

Details of this action will not be released until next Sunday, but sources close to the Council indicated that prime targets were likely to be the Inland Revenue computer installations at Shipley in Yorkshire and Cumbernauld in Glasgow, and the VAT installation at Southend. About 17,000 members of the Civil Service unions are computer staff.

The two Inland Revenue offices are responsibe for processing tax and National Insurance returns for both PAYE and Schedule D employees, assessing corporation tax, and handling cheques amounting to an average £600 million a week.

The effect of a strike would be that this money would not be banked, with consequent losses of interest revenue as well as inhibition of cash flow for the duration of the action. The government could prevent this only by resorting to non-union staff to handle the cheques, the consequences of which would be incalculable; in any event, the computer processing work would not get done and would have to be caught up later.

Both installations use ICL 2900 equipment. Cumbernauld has a 2972, and Shipley a 2970 and a 2982; both also have an NCR Century 75 for cheque-handling.

Another possible Inland Revenue installation target is Centre 1 at East Kilbride, also in Glasgow. This office assesses PAYE payments and issues coding notices for the whole of Scotland, and has an ICL 1904A installation. It does not, however, handle any money.

The other probable target for action is the VAT installation at Southend. Using ICL System 4 mainframes, the centre processes over 100,000 VAT returns a week, resulting in a net revenue to the Exchequer of around £250 million.

This includes both payments and returns. Many of the 1.3 million organisations registered for VAT are zero-rated or predominantly exporters, and so receive money from the Customs and Excise. These organisations are geared up, in terms of pricing and cash flow, to receive this money on a regular basis, in many cases monthly, and so would be threatened with bankruptcy by a prolonged strike.

Exactly that happened when there was a strike at the VAT installation two years ago. The effect on the government was much less widely publicised, mainly because of government reticence in discussing it. The feeling among the unions, however, is that this strike blew the government severely off course during its first few months in office, and the hope now is that more all-embracing action this time will prove even more damaging.

The action on March 9 will be the first time that all the white collar Civil Service unions have gone on strike together. The nine unions involved are the Society of Civil and Public Servants, the Civil and Public Servants' Association, the Institute of Professional Civil Servants, the Inland Revenue Staff Association, the Civil Service Union, the Association of Government Supervisors and Radio Officers, the Prison Officers' Association, the First Division Association and the Association of Inspectors of Taxes.

Pilkington invests in WP distribution

by Rory Johnston

DIKTAT, the word processing distributor and bureau with headquarters in Manchester, is to receive substantial investment from the Pilkington glass group as part of a scheme which encourages firms to move to St Helen's, Lancashire.

Rainford Venture Capital, in which Pilkington is the principal investor, will receive a minority equity stake in Diktat for an as yet undisclosed sum while John Pollard and his partners, who started the firm with only £3,500, will retain control.

Diktat sells Jacquard combined word and data processing systems.

The Jacquard equipment and the associated Pertec disc drives are assembled in the North West in a plant which will shortly be moving to St Helen's. The company, however, does much of its sales in the South through an office in Guildford.

The Rainford money, says Pollard, will be used to finance expansion and increase customer support facilities. Diktat tends to take on staff with no word processing experience, and has been hiring several TOPS graduates as technicians and support staff.

Special software that customers ask for is subcontracted to software houses. There is no intention, says recently joined marketing director David Ensor, to get into speculative research and development.

Diktat M D Pollard

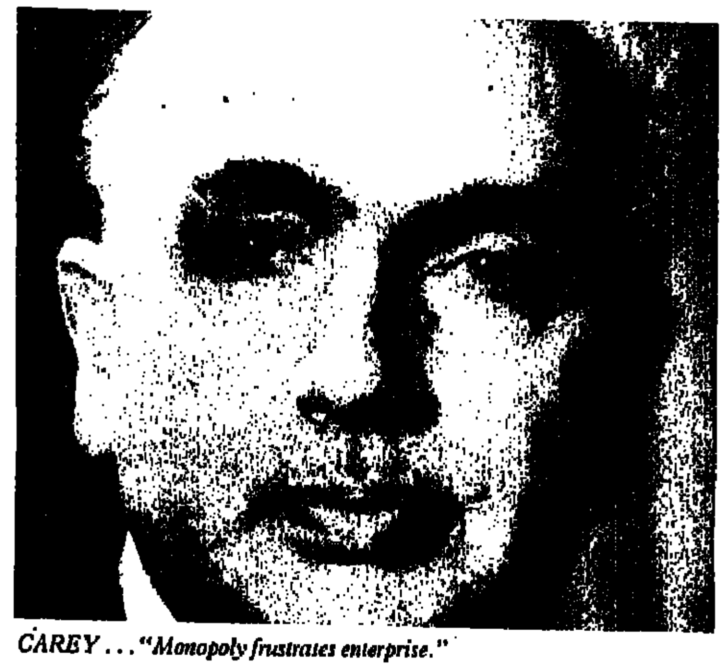
'Communications industry needs the force of competition' – DoI chief

by Rory Johnston

THE development of communications in the UK has been seriously inhibited by the Post Office's monopoly and should benefit greatly from the current Telecommunications Bill. That is the view of the top civil servant in the Department of Industry, Sir Peter Carey, who told a distinguished gathering of industrialists and officials, "The communications industry needs to be driven by the force of competition."

Carey, who is permanent secretary at the DoI, was rebutting a suggestion by Alex Reid, director of business systems at British Telecom, that the monopoly had helped BT rather than held it back. Said Carey, "I believe that monopoly frustrates enterprise," adding that there was "a need for better energy between BT and the private sector."

In the audience at the Royal Society of Arts were a large number of directors of ICL and of software houses and consultancies, and senior staff from the societies and government departments. They heard Carey give his view of the impact of telematics in industry, a summary of the government's attitudes that have been becoming clear over the last few months. Such speeches are taken by civil servants lower in the hierarchy as means of detecting the general direction of future policy.



CAREY . . . "Monopoly frustrates enterprise."

Carey affirmed that, by becoming more competitive, the UK computer and communications industries must try to take a larger share of the estimated £50 billion world market for these products, of which the UK now only has 6%, less than in many other industries. He warned the financial sector, traditionally one of the UK's strengths, that its eminence, based on its tight geographical concentration in the City of London, could be undermined by developments in communications.

Replying to a question about public funding of local and European industry, Carey dealt with the thorny issue of whether foreign-owned firms with substantial local manufacturing, such as IBM and Honeywell, should be treated less favourably than UK-owned companies.

Said Carey, "To all intents and purposes we regard multinationals as British companies."

Some government demonstration projects in office automation were already under way, Carey announced. These are in the areas of word processing, electronic mail, and internal viewdata. Plans were also moving along to provide all schools with microcomputers and software to go with them.

The Royal Society of Arts is interested in including computers in its subject area and acting as an interface between the interested groups in industry and education.

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TSB steps up its automation throughout UK

by Brandon Gamester

WHILE the four big clearing banks in the UK continue to shuffle their feet at the start of the course to online; real time computerisation of customer transactions, Trustee Savings Bank of Northern Ireland last week celebrated 10 years with this level of technology. At the same time it announced an £800,000 order for terminals from Burroughs, heralding a further stage in its bank automation.

The order is for 200 modular terminals, comprising a separate disc drive unit, VDU, pass-book printer, and combined keyboard/card reader, which will be located in the 56 TSB branches throughout Ulster. Similar systems have been ordered from Burroughs by TSB Computer Services, which is introducing over 4,000 of the terminals to branches of the Trustee Savings Bank in England, Scotland and Wales.

Apart from the bank's existing capability to provide customers with account statements including the last six transactions, the new terminals will provide access to details of a customer's banking history, enabling a manager to make decisions on overdrafts and loans, says the bank.

The use of up to 96K-bytes of storage with each terminal also allows a tally of the day's transactions to be held, and accessed via the VDU. The bank hopes this and other information held at the terminal will lessen the dependence on telephone lines to the bank's central mainframe, with the attendant risks of line failure.

The TSB went into computerisation because its transactions were particularly labour intensive. Although cheque books were not issued, many customers had salaries, standing orders, and giro payments on their accounts, all of which had to be recorded in pass books. There were delays at the counter and posting to accounts was done manually.

By February 1971 (just before decimalisation) the bank had provided all its branches with terminals linked online, real time to a central computer in Belfast. The network was claimed to be the first of its kind in Europe.

Burroughs Machines' managing director Laurie Rushton told Computer Weekly that he saw banking as his company's most important market for the next few years. The TSB was demonstrating the potential benefits available through computing, and the major clearing banks would have to follow soon if they were to keep labour costs down and remain competitive, he said.

The TSB is now looking closely at the advantages a viewdata system could bring if integrated into the bank's terminal network.

Brian Johnston, general manager of the bank, believes that resultant savings on postal, paper and handling costs of providing circulars of instruction and current banking data, could be high. Further ahead, he sees no reason why customers should not be able to access their own account information via a television in their homes or offices.

One of the strategies used by the TSB to attract the 60% of people who do not have a bank account is the provision of real time cash dispensers. One of these is located in Harland and Wolff's shipyard in Belfast where a special arrangement between the bank and Harland employees ensures that wages are paid directly into each employee's TSB account via the transfer of reels of magnetic tape. The money is then immediately available from the cash dispenser.

One of Burroughs' modular counter terminals, currently being installed in nearly 1,000 Trustee Savings Bank branches.

NEWS BRIEF

Philips in US optics deal

PHILIPS is to acquire a half share of Valtec Communications Fibre Optics, one of the top three US optical fibre companies alongside ITT and Siecor (a joint venture of Siemens and Corning Glass). The other half is to be retained by communications company M/A-Com which bought all three Valtec companies last September, the others two being Laser Diode Laboratories Scope, a coaxial cable manufacturer.

Olivetti changes

OLIVETTI has regrouped all its telecommunications-related production under one autonomous company called Olteco, operating from Ivrea in northern Italy. The company, headed by chairman Carlo de Benedetti and managing director Luigi Mercurio, makes data transmission networks, telex and telephone exchanges and teleprinters in Italy, Spain and Brazil.

Illinois deal

RECOGNITION Equipment, of Dallas, Texas based OCR equipment manufacturer, has signed an agreement to buy the operating assets of the Data Systems Division of the Cummins-Allison Corp of Elk Grove, Illinois, for $4 million. The Illinois operation builds a range of data entry systems, including key-to-disc and OCR, and RE is particularly interested in its systems for cheque and remittance processing. RB's UK subsidiary is based at Slough, Berks.

Japanese aid

FIVE South American countries are keen to get Japanese help to implement packet-switched public data networks, according to Japan Data Communication Association of Tokyo. Brazil inaugurated a circuit-switched service called Transdata last May, but wants to start a packet network by the end of next year, while Argentina plans to start one this year and Chile, Peru and Colombia plan to follow suit.

Brazil choice

BRAZIL has picked the French Teletel viewdata system for a market trial, after an investigation by Telesp, a leading Brazilian telecoms company in which France Telecom is believed to have been the favourite. The initial order from France's first export order for Teletel, is believed to be worth about £1 million and to have been agreed as part of a reciprocal trade package between the two governments.

Takeover

DATA GENERAL has fulfilled its promise to take over a minicomputer systems manufacturer (CW, October 23, 1980). The firm is Megatek of San Diego, California, a major supplier to the computer aided design/computer aided manufacturing industries. DG will exchange 280,000 shares worth nearly $5 million for the Megatek stock.

IBM man jailed

GERHARD ARNOLD, a former IBM employee in West Germany, was jailed for two and a half years on February 5 for spying on behalf of East Germany. The judge said that Arnold had given information beyond industrial espionage and had been decorated six times by East Germany. The offences were committed between 1969 and 1978.

$3m SA order

THE South African Post Office has placed an order with Olivetti worth US$3,100,000 for 750 branch terminals to form part of Saqonet banking network. The order brings the total value of the country's business with the Post Office to $25 million.

Pioneer user gives thumbs up to X25

by Donald Kennett

SUPPORT for the X25 packet switching protocol as a basis for distributed data processing came from a satisfied user last week. But John Thomas, communications manager of South West Universities Regional Computer Centre, warned an NCC seminar on implementing an X25 interface that distributed data processing was not achieved just by plugging machines into a network. The bulk of the work involved went into the areas outside the X25 specification, he said.

Changes had been made to X25 since it was published in 1976, but it was "pretty stable" compared with work on the higher levels of the International Standards Organisation's seven-layer networking scheme, he added.

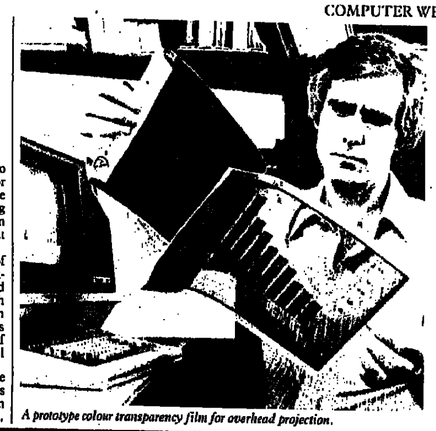
"Beware if you think you can do-it-yourself, because the protocol specification is very much the tip of the iceberg: it doesn't say anything about management functions, the user interface or procedure calls."

The biggest problem was to produce the high-level protocols these functions depended on. Once they were in being, it was possible to switch around from one machine to another, use public networks such as PSS and gateways to other networks as much as desired, he said.

Exeter University, one of the five directly connected to SWURCC, is also using X25 for local networking in a pilot scheme based on a GEC packet switching exchange, set up in co-operation with the Computer Board's Joint Network Team.

X25 made interconnection of networks easier than had been expected, reported Thomas, and connections had been made with Arpanet in the US, as well as with the Science Research Council's SRC-Net and what remained of British Telecom's experimental EPSS.

The decision to adopt the emerging international standards had been a key element in SWURCC's development strategy.



A prototype colour transparency film for overhead projection.

Colourful business

by Rory Johnston

BUSINESS presentations will be able to include colour graphical representation of financial results and other statistics from computer, using an instant-development film to be introduced within a year by Polaroid. The 8-inch by 10-inch sheets of film are inserted into a Calcomp 31 recorder, which optically duplicates a colour CRT image onto the film.

Exposure and development take about two minutes, producing a transparency ready to go on to a projector. Instant colour pictures on paper can also be produced from graphics terminals.

Polaroid is also developing an extremely fast film for recording oscilloscope images so quick that the human eye cannot possibly see them. Exposure times can be in the order of nanoseconds.

New company offers no-keyboard input

by Keith Jones

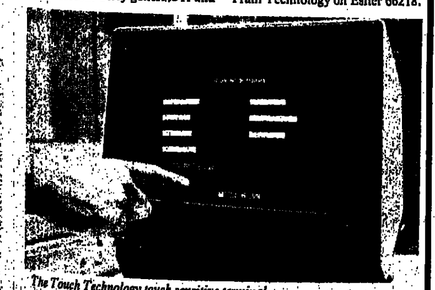
HOSTILE environments and command and control systems are two of the big potential application areas for the touch sensitive terminal launched by Touch Technology, a new firm owned 50/50 by Mellordata of Colchester and Pulse Train Technology of Esher, Surrey.

Pulse Train's boss, Alan Hendrickson, one-time managing director of the CRC Group, has acquired the manufacturing rights to the touch sensitive technology employed in the terminal from the Carroll Manufacturing Corp of Champagne, Illinois. Carroll developed it in conjunction with the University of Illinois which still holds the patents.

The term "touch" sensitive is something of a misnomer because the technology involves rows of infra-red light emitters and receivers positioned around the rim of the screen. They generate X and Y co-ordinates when horizontal and vertical beams are broken by the operator's finger or some other pointing implement. A microprocessor in the terminal encodes the information as ASCII characters and transmits to the host computer.

Pulse Train is collaborating with Mellordata mainly because the Colchester firm is the UK distributor for Datamedia, US manufacturer of the Model 3025A terminal which Carroll designed the infra-red assemblies to fit. But Pulse Train says that it can also provide touch capability for other terminals on a special quotation basis.

The terminal is seen as being particularly well suited to applications involving naive users or requiring faster and more accurate input than via a keyboard. It will be demonstrated on March 18/19 at the Berners Hotel in London and interested parties should contact Margaret Finch at Pulse Train Technology on Esher 66218.



The Touch Technology touch sensitive terminal.

Burroughs

● From front page

lion is intended for use in the stated Bendix policy of acquiring high technology companies.

Burroughs, which recently announced much reduced profits of $31.9 million for 1980, from $304 million in 1979, is currently capitalised at over $2 billion. This would imply that a merger and not a bid was in the offing.

However, sources in the US feel that the conflict of interest statement, in genuine, particularly in view of the very strict rules applied to conflict of interest situations by American Securities and Exchange Commission.

Burroughs in Detroit said that they had no reason to believe Bendix was in the process of making a bid. No negotiations of any kind were or had taken place, the company said.

Financial circles in New York confidently expect that Bendix will shortly emerge as the bidder for one of the small computer companies.

Freeze raid

● From front page

Oxford as one of the additional distributors appointed by BCS and said that Telecomputing planned to take legal action to stop Hytec from importing kit from BCS.

"According to Martin Hodson the main driving force behind the BCS actions is its major shareholder, the DLJ Capital Corp; it told Hodson that it would not like the funds Telecomputing was acquiring from its legal settlement with ICL (see page 2) to be used to buy shares in "any other company". Hodson said that Telecomputing was currently seeking to acquire the 900,000 shares in BCS Microsystems held by BCS founder Michael Roberts, through BCS Holdings. These shares, together with Telecomputing's existing 100,000, would amount to about 50% of the stock in the US firm.

Roberts founded BCS and transferred manufacturing to California in 1980 with funding from US interests, including DLJ.

China boom

CHINESE imports of Western communications equipment could reach $250 million a year by 1984, according to a report from International Resource Development in the US. Imports currently stand at $90 million a year, the report says, compared with Russian imports of $160 million which are thought likely to decline.

China is expected to try for a quick transition to digital switching and transmission to avoid later conversions, because it currently has few telephones.

Water will be safer

by Jack Gee

PARISIANS' drinking water will soon be safer and the risk of flooding reduced thanks to a £10 million programme to control the operation of the metropolitan area's sewers by computers.

Within five years, the rate of flow in the River Seine and the sewers will be measured at 174 catchment points by instruments linked to a central computer at Suresnes, a Paris suburb.

The computer will automatically open sluice-gates when danger levels are reached and enable excess rainwater to be cleansed at pumping stations.

Pierre Pommellet, head of local planning for the Paris area, said the £10 million represented only two years' average expenditure on the upkeep of the Paris area sewers.

The authority's big scale order means that the price of specially designed computerised equipment for water flow control will drop to only one quarter of present levels.

Ex-manager sets up on his own

by Kevin Cahill

MIKE EDWARDS, until recently marketing manager of the French SEMS group in the UK, has joined the growing number of entrepreneurs and started his own company.

Using his own and family money he has set up in Newbury importing the unique Canadian Q Engine which he describes as a Pascal machine, based on the 16-bit Western Digital Pascal micro engine chip set.

Edwards decided to set up on his own having taken a careful look at the bottom end of the computer market, which looked to him to be both under-exploited and more recession-proof than either the middle or top end of the market.

He made his early decision to go it alone from his own experiences of selling in the UK, but decided at Compec on the product he wanted.

Edwards believes that the best opportunities for UK entrepreneurs lie in taking a product, not necessarily UK produced, and adding value via the software.

In the case of the Q Engine he plans initially to develop a general accounting and production control package running under Series I Virtual Basic. This will take the machine more directly into the commercial market and Edwards intends to add cross-compilers for both Basic and Fortran, though not Cobol.

This is because the educational and scientific markets are seen as the primary area in which the Q Engine will sell initially.

Edwards has spoken to various potential backers, but prefers to put up himself the £20,000 he reckons it will take him to get going.

Mike Edwards operates the Q Engine which he will market in the UK.

Software copying row settled

by Claire Gooding

US MICROSOFTWARE supplier Lifeboat Associates, which distributes products from Digital Research, Microsoft and others, has come to an agreement with a small Japanese firm, Kobunsha, which copied and sold its software without permission.

"The differences between us are resolved," Lifeboat president Tony Gold told Computer Weekly. "They admitted that they made copies of the software, based on a misunderstanding of the correct procedure. They said it was done in error, and have undertaken to replace all the discs tested with authorised copies from us".

The unauthorised marketing came to Gold's attention when he was shown a copy of one of Lifeboat's advertisements in the Japanese version of the trade journal Interface. He established that the products being sold were copies, notified the firm, and discussed the problem with them.

"I have no allegations of illegal conduct," he told Computer Weekly. "I have explained the correct procedure, and they have agreed to repair their error."

He added: "We are planning to set up a joint venture company in Japan to market Lifeboat products so there will soon be a legitimate distributor out there".

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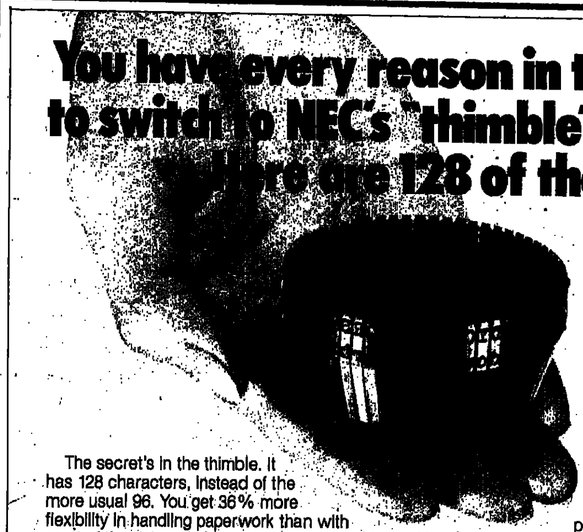

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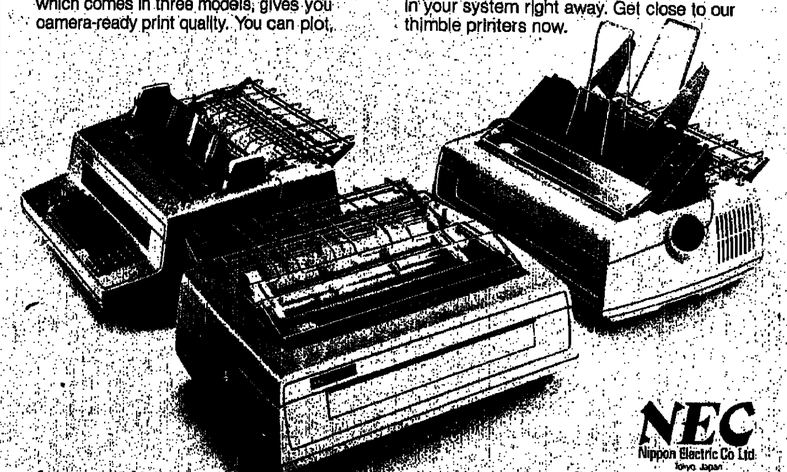

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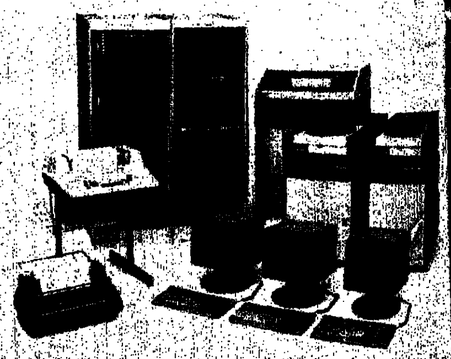

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SOFTWARE FILE — by Claire Gooding

Products users can tailor to suit themselves

"I'M not sure exactly what I want, but I know that this isn't quite it" sums up a problem familiar to users, particularly first-time users, as well as the people who try to supply them with packages or tailored software.

The unusual thing about the systems supplied by Contour Computer Services is that while certain features such as communications are bespoke and specialised, the basic business packages are adaptable. Once the user has become familiar with the package and begun to spot those small but expensive alterations which would make it fit his business so much better, he can tailor it himself.

"Someone has to have a conception of a system in the first place, and that person will decide on a certain profile, format, and results in the design. That provides the profile of a package but not everyone would agree with the parameters, so eventually the user will end up paying exorbitant amounts to have stuff changed to fit his ideas", said Contour manager Keith Salmon.

"Constantly I get businessmen coming to me who have been told they can't have this and they can't have that. They don't know their bits and bytes, and they don't really want to get involved in the technical stuff, but they do know their own businesses."

Salmon continued: "We tell them they can have whatever they want on their system. I won't accept that you've got to put up with certain things. The business world isn't like that. A computer is a computer, not an accounting machine, a word processor, a calculator, data communications tool, or a memo pad, but if I want all those functions on a microcomputer I'll find a way to do it."

Contour buys in whatever it can, and makes what it can't, providing specialised systems with real time features or communications "bolted on". The company sees itself as the Harrods of the CP/M and MP/M market place, supplying any reasonable request, lasers and fibre optics included.

The ISB Insta-system of adaptable packages was written by Computersense of North London, and Contour discovered it when looking for a standard estate agents' package.

"I'm used to the idea of report generators parameterised programming, and although there have been lots of attempts to provide skeletal programs, databases, flexible systems which can be bent to user's requirements, most of them, like IBM's RPG and ICL's NICOL are so complicated, they're really languages," said Salmon. "I was amazed to find it all on a micro."

Peter Crozier, managing director of Computersense, believes the main problem of the burgeoning micro industry is the servicing and support of machines and software which become obsolescent too quickly. He has found a new, more demanding breed of end users as a result of the explosion of microcomputing into the small business market.

"They expect to be able to change the jargon, even the end language, or access files in another system. What we do is supply a basic package, doing all the normal things, but it works with tables, so that parameterised values in any language can be changed or added. The beauty of it is that the customer can do it himself, and the unique thing is that it works."

Led through the system by menus, the user can change field values and make temporary and permanent alterations to the reports without changing any of the Basic coding.

Using the Insta-system "self-service tailoring" feature, one customer built a cost centre analysis program in 1½ days, working on a payroll which needed 250 parameters for each employee. "With highly unionised payrolls, personnel departments sometimes want an enormous number of fields and parameters; they can have as many as they want, and change them as often as they want without calling on professional programming help," said Crozier.

"The important thing with any system is that it should be open to change, and compatible with future requirements."

Computersense avoids using such terms as database, or relational, and does not think of the packages as being in the same field as program generators or development tools. However, the features provided in the Insta-system modules are designed to the same end as such generalised tools, namely flexibility.

Although the packages cater for a general market with accounting, sales, and inventory modules, Contour sees potential in attacking specific markets such as solicitors and estate agents. To get the message across, Contour is staging one-day exhibitions, an idea borrowed from office equipment firm Adler, at which potential users can inspect the systems.

Each module costs £575, and all Insta-system programs work under CPIM on Z80-based machines. Users include Dan Air, Letraset and Augustus Barnett.

Users try out Computersense packages at one of Contour's one-day exhibitions.

A user's eye view of self-service packages

ONE user of the payroll module from the Insta-system is Dan Air, which previously used a bureau service for its 2,500 employees.

"The payroll bureau gave us very good service for several years but we have so many different payments to make to our employees that we had to do an awful lot of filling in of forms, for factors like overtime. It sometimes amounted to 6,000 lines of input, which was an enormous effort with only two people running it," explained Bernard Smith, Dan Air's payroll manager.

"Insta-pay not only provided us with the means of doing the job, but made it easier and cheaper. About 1,500 of our employees are on pay scales, which means that different groups get rises each month.

"The amendments that used to take three days, now take two minutes as we've built everything into Insta-pay so that updates are done automatically.

"Doing what we're doing needs a methodical mind, and average intelligence. It totally de-skills the exercise of programming.

"The whole thing is run by two clerks who know nothing about computers but know quite a lot about the way we run our payroll."

Triad launches manager

A PORTABLE Codasyl database which can manage several independent databases within the same system has been launched by Triad. The Multiple Database Management System runs on VAX-11 under VMS, PDP-11 under RSX-11M, and ICL 1900 under George 3/4.

It offers two levels of data independence, which means that datasets can be extended without affecting application programs or the data already stored.

MDMS was developed by Triad for engineers and scientists at the Royal Aircraft Establishment, Farnborough, where the database is also used for handling administrative data.

The price of an MDMS licence is in the range £15,000 to £25,000.

Mini system

US systems house Informatics, best known for its mainframe products such as Trans IV, released to the UK and Europe, has its first application from its new minicomputer application products division. It is a version of the General Ledger and Financial Reporting system for the IBM System 34, to be followed by Hewlett-Packard, Wang, Prime and other versions. First buyer beside the US is Shell.

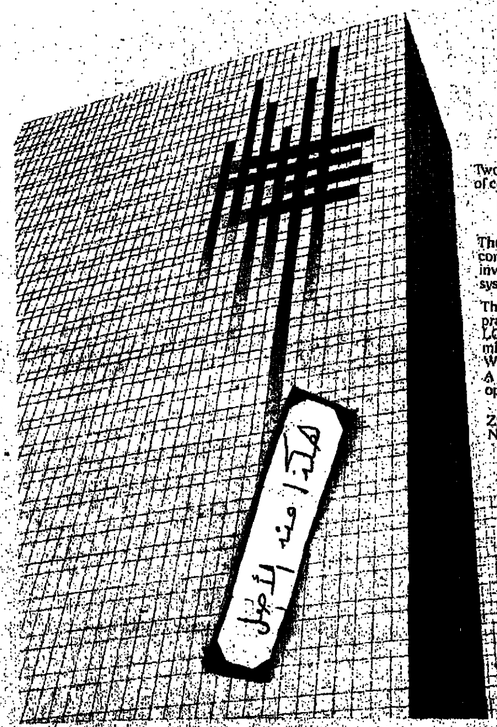
Xenix for Logica

SYSTEMS house Logica has signed an exclusive agreement with Microsoft in the US for European marketing rights to the Xenix operating systems on Digital Equipment PDP-11 minicomputers. Microsoft's Xenix is based on version 7 Unix, the Bell Labs time sharing operation system.

Logica is already selling the system for PDP 11/23 and 11/34 machines as a complete package.

LCN BSN

...these stand for the computer system of the future.



Two newly defined and rapidly developing forms of computer technology are emerging:-

LOCAL COMPUTER NETWORKS (LCN)
BACK-END STORAGE NETWORKS (BSN)

These two developments will be the keys to computing and communications in the 1980s, involving the pooling and sharing of storage and systems resources, including large data bases.

The NESTAR CLUSTER/ONE MODEL 'A' is a practical, cost effective implementation of an LCN, using proven hardware, Apple microcomputers and dual floppy disks or 14" Winchester disks for the BSN.

A number of these systems have already been in operation for one year.

Zynar is the European business partner of Nestar Systems Inc.

Zynar Limited, 12A/1 High Street, Uxbridge, Middlesex UB8 1JT.
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SILICON TECHNOLOGY & COMPUTER SCIENCES

Mark Potts, managing director of Rair, explains the success of the CP/M operating system, 'the software bus'

Why an 'accidental' development became an industry standard

The Rair Black Box II microcomputer system

AS with Isaac Newton's discovery of gravity and James Watt's invention of the steam engine, one of the most significant developments in the microcomputer industry came about almost by accident. As so often happens, no one at first realised the immense commercial value of what had come into being.

In 1975, Gary Kildall invented CP/M (Control Program for Microprocessors), the microcomputer operating system which became a widely accepted standard for 8-bit operating systems, dramatically widened the use of small computers in commercial companies, and which is still capable of significant enhancement.

The development of CP/M was based on the concept of common hardware. The introduction of the Intel 8080, and later the Zilog Z80 and Intel 8085, provided 8-bit microprocessors which could be used as a basis for low-cost small computer systems and this, with the development of Shugart of an independent OEM floppy disc drive, meant that by 1976 the hardware was to hand for the creation of low-priced but powerful microcomputer systems.

The main stumbling-block to progress in this area was the lack of simple, suitably priced software. A number of operating systems were available, all of which were expensive as a result of high development costs.

Kildall's brainchild was a simple operating system with low development costs which, by selling it at a low price, could be taken by large numbers of small computer users.

Kildall could hardly have been aware of the true commercial value of CP/M; at a time when the microcomputer industry was absolutely ripe for such a system, he put CP/M on to the market at an almost ridiculously low price.

Mass sales were inevitable. All the emergent systems developers and hobbyists jumped on to the CP/M bandwaggon. Rair, for example, took early advantage of the new combination and implemented CP/M as the standard operating system for its Black Box range of microcomputers.

Here, for the first time, ranges of computer systems had the potential to run on the same software, and during the next two or three years a whole new software industry developed around Intel 8080 and CP/M compatibility.

Household names in the industry rapidly adopted CP/M. For example, Microsoft achieved a virtual monopoly of programming languages such as Basic, Fortran and Cobol under CP/M; Micropro offered a number of packages such as Wordstar and Supersort; Microfocus offered CIS-Cobol and Lifeboat Associates, though it did not develop software, marketed a wide range of CP/M compatible systems in various disc formats from other vendors.

A recent significant expansion of the market for CP/M has been the introduction by Microsoft of a hardware option allowing CP/M and its applications to run on the Apple II, the world's best-selling microcomputer.

The range of software available under CP/M is now so vast that CP/M is often referred to as the software bus. Language compilers (often several versions) are currently available for Basic, Fortran, Cobol, Pascal, APL and PL/I as well as more esoteric languages. Software tools range from video editors, sort packages and word processors to full Codasyl and database management systems, and almost every conceivable type of applications package has been implemented.

A unique feature of this software range, resulting from its rapid exposure to a large user base, is its robustness. Experienced DP users may be surprised at the quality of microcomputer software, which often surpasses that on the mini and mainframe systems they are used to.

CP/M has by no means reached the end of the road as far as development and enhancement is concerned. Several significant developments have recently been introduced. For example, Digital Research, the company headed by Gary Kildall, has introduced CP/M version 2.0, whose most important feature is an extension to CP/M's file handling capability from 512K-byte floppy discs up to large hard disc systems of 128 megabytes or more.

Equally significant are the two new members of the CP/M family — MP/M and CP/Net.

MP/M is an upwards compatible multi-programmable operating system that, given suitable hardware, will allow multiple CP/M compatible programs to be run simultaneously on a single microcomputer system. MP/M is considerably more complex than CP/M, and is supplied only on an OEM basis for manufacturers to tailor to their own hardware.

Sound implementations of MP/M are just beginning to appear; one of these is on the Rair Black Box III, a microcomputer system which supports multiple hard disc drives and memory management up to 0.5 megabyte and, with an advanced implementation of MP/M, supports up to 16 terminals with eight simultaneous user applications.

CP/Net is a network support package running under CP/M and MP/M, which allows multiple microcomputer systems to share resources in a distributed processing network.

CP/Net, like MP/M, is also available only as a OEM product and is tailored by the implementer to the interprocessor communications mechanism available on his particular equipment. On Black Box III, for example, interprocessor communication can be effected either by serial link-up to 9,600 baud or via a high speed bus.

From Kildall's simple concept in 1975, and the impetus provided by the combination of high demand with a low user price, he developed a powerful software framework allowing the microcomputer to compete in performance with mini and mainframe systems, but at much lower cost.

More advantages of CP/M are becoming apparent even now, with the development of distributed processing and its use on local area networks such as Ethernet. There are planned extensions to existing products in the family; a new version of MP/M is due shortly, with further extensions to CP/Net to enhance its capabilities. Also, watch for the release of CP/M-86, a version of CP/M developed for Intel 8086/8088 based microcomputers, and a planned version of MP/M for these machines.

As with many developments in our industry, the development of applications software may not keep pace with the development of systems. It is likely that the basic 8080 CP/M compatible systems will maintain their dominance for some time to come, by virtue of the large mass of applications software now available to run on them.

I personally wonder whether the emerging range of 16-bit microcomputers can rapidly attain the critical mass of software which has been created for 8080-based microcomputers running under CP/M, and which will be essential if these systems are to achieve a market breakthrough.

High-resolution problem solver

A HIGH-RESOLUTION graphics package for the Apple II microcomputer has been developed by Systematics of Bushey, Herts. The package is written in machine code and is accompanied by Basic routines for easy incorporation into applications.

Called the Hi-res graphics problem solver, the package is available with full documentation for £45. It comprises individual routines like fast printing, screen rolling and blocking, and shape definition.

The minimum hardware required is an Apple II with 48K of RAM and one minifloppy disc drive.

Home comms service from TI

A HOME communications service called Texnet is being developed by Texas Instruments for the TI99/4 personal computer. Texnet will operate as an extension of Source Telecomputing's computerised information utility called The Source, which is available throughout the US.

Texnet will be available over telephone lines in the US which are coupled to the TI99/4 and its peripherals. All the services of The Source will be available together with databases using colour graphics, sound, music and speech capabilities. The service is to be supplied on a subscription basis.

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Starting out alone: the first in a series on how to set up your own firm

So you think you'd like to run your own company?

THE Budget on March 10 is expected to contain further measures, in addition to those announced last year, aimed at helping small companies to start up and grow.

Small business has been recognised as a "good thing" for some time. So over the next few weeks we shall be looking at the problems and opportunities facing someone wishing to go it alone – setting up a company, getting finance, and coping with expansion.

"Leaving the womb"

The majority of people in this country work for large or small institutions where much of the burden of administration is carried out by the parent organisation's bureaucracy.

The first question most people will need to ask is whether they want to face, by themselves, the whole range of tasks, from dealing with the taxman to paying the phone bill, carried out by their current employer?

The most recent statistics available, for 1979, show that 133,971 new businesses were started that year. A large number of those new businesses were people starting up on their own and, comparatively, not many were failing. In that year 3,902 businesses were wound up, less than 3% of those starting (the figures don't show how many companies simply ceased to trade).

So, having decided that life outside the corporate womb is possible, what next? First you must ask yourself whether you can survive without the weekly pay packet or monthly pay check, and bound up with that question must be another: Will the business you are starting to provide enough money to enable you to live after you have paid all your additional expenses – and they will be many?

To answer the second question – which you should do in outline before proceeding to estimate the financing requirements of the business itself – you need to set up a simple "cash flow" statement. All this means is that you put your expenses on one line and your income on another. By subtracting your expenses from your estimated income you will quickly see whether you are viable or not – at the very least you will see what you have to achieve by way of income to become viable.

'Ready to go'

Within the computer industry there are four basic business streams.

The first is that of producer of either software or hardware. The second is the marketing and selling of basic industry products. The third is servicing the industry, including things like employment agencies and so on. The fourth stream is self-employment as programmer, engineeer or analyst. There are many other ways of operating in the industry, but most forms of business relate to one of these four streams.

The chances are that you will have a good idea which of the streams you want to start in because you already work in one of these areas.

The last of the streams, the contract employment market, offers the fastest route to self-employment and for many acts as a route by which they generate enough capital to start the actual business. But the same initial question will face a person starting out on the contract path: How do I establish myself legally so that my liabilities for tax and for the operations of the business are minimised?

There are a variety of ways to "incorporate" yourself to achieve the best result. The commonest methods of incorporation are as sole trader and as a limited company. Briefly, as a sole trader your assets, your house and everything you own can be lost if your business gets into difficulties. As a limited company you can separate your personal finances from those of the business and your personal assets cannot be held forfeit.

To get the best advice on which option to select – and there are several other ways of setting yourself up besides those mentioned – you will need an accountant. But bear in mind that the accountant's advice will be as good as the information you can give him. So, before going to an accountant, map out for yourself an elementary business plan stating your business and financial objectives. In the case of a software producer such a plan might contain details of when you expect to produce your first package, take on your own machine, hire additional staff. Don't confuse the issue with technical jargon; and don't be too prolix, as the Americans put it (that means don't be verbose).

In practice, your accountant will be able to help you with all the legalities surrounding the setting up of a company or partnership. Initially you should not need to consult a solicitor, but setting up is a good moment either to brush up your acquaintance with your family solicitor, or to put your name on the books of one.

If you have decided to work through a company you still retain the right to pay yourself as a self-employed person, thus avoiding the weekly or monthly problems of PAYE accounting which confuse even the professionals and can involve up to 22 bits of paper.

Before going on to the topic of how to fund your new enterprise there are a number of points to consider, the first of which is Value Added Tax.

VAT

VAT is a tax you levy on your customers on behalf of the government. If you register for VAT you can in most cases reclaim, before you pay the government, the VAT you paid yourself. The level of turnover at which you must register for VAT is set, usually in the Chancellor's March Budget, and the point to remember is that you can be back-assessed if you pass the limit in any year of trading.

Accounts

Your accountant will advise you what accounts to keep and you should follow his advice. The basic books you must have are cash books, wages books, day books and ledgers. Be sure to keep your bank books carefully (they can be used as ledger accounts).

Money

Most new enterprises need more money than the founders can provide, just to get off the ground. The normal source of most new business cash is the nearest branch of your local clearing bank, ie Barclays, Midland, Lloyds etc.

In a later article we will cover the various services offered by the banks. Here we will simply show you how to lay out a financial cash flow for your business – the best communications device for dealing with a bank, whether you intend to raise a £50 overdraft or to borrow millions.

The table (left) shows the basic items which might appear in the first cash flow prepared by a new business. It is a simple measure of cost against income over a period of time. Cost will include depreciation, but your accountant should help when you reach the point of wanting to maximise the balance sheet using depreciation to generate cash.

Finally, there are a range of helpful books, quite brief, if a little academic, produced by the Small Firms Division of the Department of Industry. Freephone 2444 for your set.

CASH FLOW FORECAST

Expenditure

Setting up costs	1 Month	2 Month	3 Month	4 Month	5 Month	6 Month
Professional fees etc	1,800	200	150	-	-	-
Rent/Rates	800	70	70	70	70	70
Installation equipment etc.	1,200	200	100	-	-	-
Raw materials	1,200	400	400	800	400	400
Leasing payments	1,000	250	250	250	250	250
Own wages	400	400	400	400	400	400
Employers wages Nat. Ins. etc.	1,000	1,000	1,000	1,000	1,000	1,000
Advertising	500	500	200	200	200	200
Heating/Lighting	-	400	-	-	400	-
Telephone	-	180	-	-	180	-
Loan interest	-	-	-	-	-	600
Post & sundries	50	50	50	50	50	50
TOTAL	7,950	3,650	2,620	2,770	2,950	2,970
Income						
Initial capital	10,000	-	-	-	-	-
Sales	-	1,000	1,000	1,500	1,800	2,600
BALANCE	2,050	-600	-2,200	-3,490	-4,640	-5,110

The table gives an idea of how to set about making a cash flow forecast. It will vary, of course, according to the type of business both in the figures and the expenditure items.

In the example, the business, set up by introducing £10,000, has made a loss of more than £5,000 in its first six months of trading. Hopefully, projected further, sales will increase steadily but hope is not sufficient. Realism is required. Expenditure must never be under-estimated nor income over-estimated.

A cash flow forecast is less difficult when buying an existing business, particularly if you have a guarantee of retaining existing customers. Starting a new business from scratch involves a certain amount of intelligent guesswork – but make it intelligent and remember that the first and most important person you deceive by over-optimism is yourself.

Attribution: Allied Irish Bank Money Guide. Vol 1.

CW SHARES TABLE

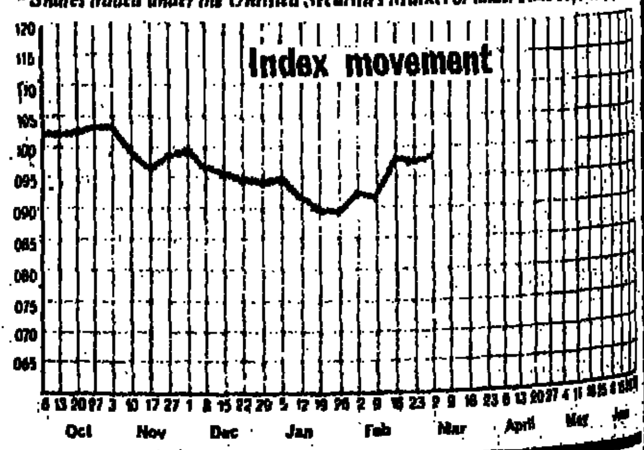
Date: 27/2/81 Index: 97.32 Change: +1.90

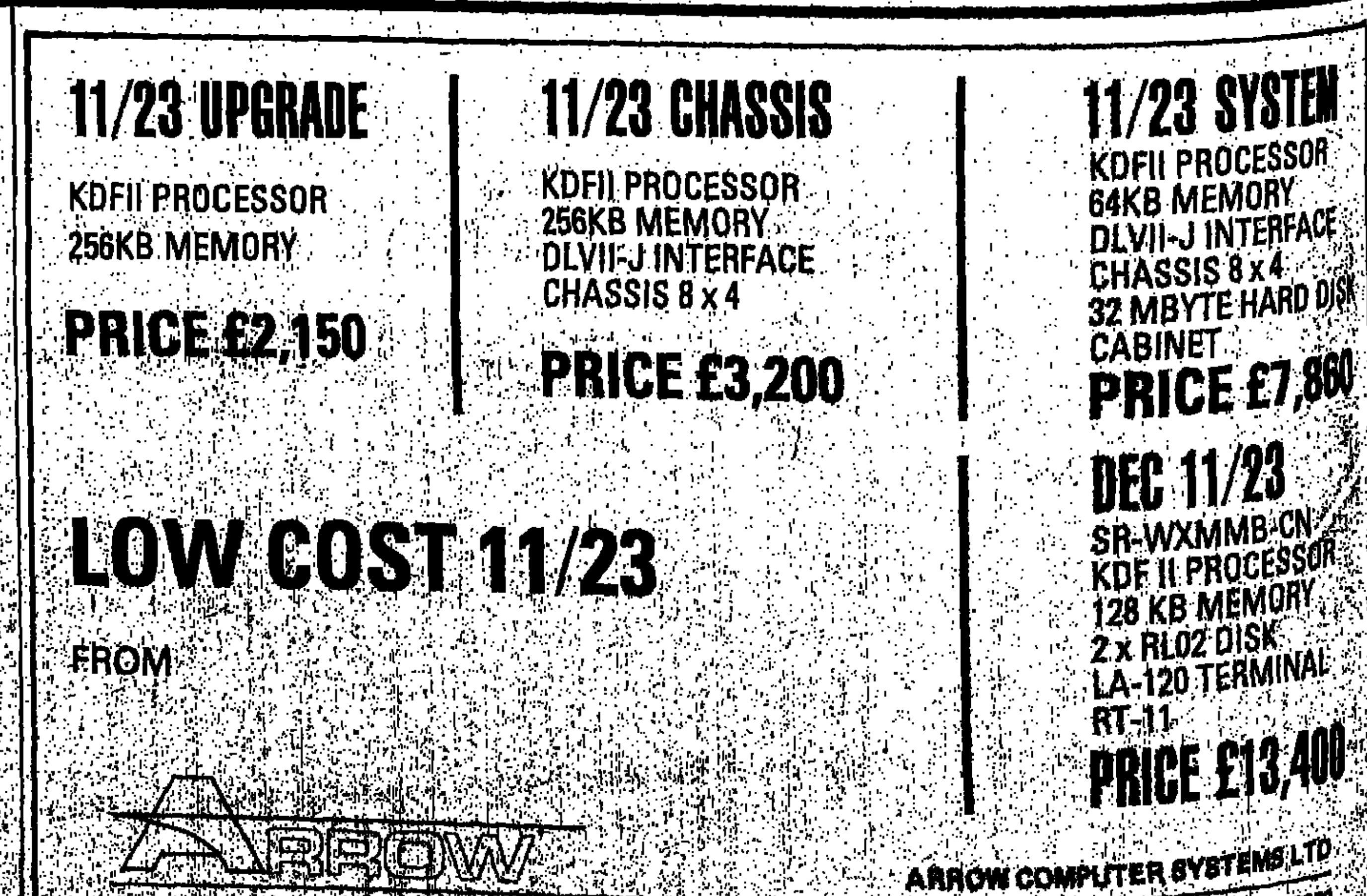
Pence 1981 High	Pence 1981 Low	London Stock Exchange Stock	Pence Price	Pence Chge
131	115	A Comp Tech (25p)	131	+2
120	102	BOC Int (25p)	119	+5
22	20	B Ruy Kent (25p)	20	½
92	63	Chubb (20p)	90	+1
63	48	Cole (R.H.) (25p)	55	+2
765	676	De La Rue (25p)	630	+5
187	172	Eurel (25p)	172	
850	423	Ferranti (50p)	650	+45
661	568	GEC (25p)	651	+8
67	38	ICL (25p)	39	2
79	61	Kalamazoo (10p)	63	+2
277	260	Koda Int (25p)	275	+5
110	78	Muirhead (25p)	104	+1
355	320	Office & Elect (25p)	320	+2
385	291	Phillips Lamp (Fl 10)	384	+8
372	265	Plessey (50p)	322	+18
363	285	Racal Elect (25p)	363	+17
133	110	Rediffusion (25p)	133	+10
314	280	Thorn EMI (25p)	314	+12
		OTHER MARKETS*		
855	770	NMW (£1)	[illegible]	45
166	165	Quest Auto (10p)	183	1
60	48	Rolfe & Nolan (10p)	41	6
220	210	ScanData (10p)	220	
$		US Stocks	$	
37	28¼	Amdahl	32	1½
32½	28½	Anplin Inc	25¼	7½
60¼	47½	Auto Data Pro	50¼	1½
63	48	Burroughs	51	2¼
2⅞	2⅛	Commodore	[illegible]	¼
18⅝	18¼	Comp Automation	15¼	⅝

$ 1981 High	$ 1981 Low	US Stocks Stock	$ Price	$ Chg
21⅝	16¼	Comp Sciences	[illegible]	[illegible]
18	17	Comshare	[illegible]	[illegible]
68⅝	60¼	Control Data	[illegible]	[illegible]
38¾	31⅝	Cray Research	[illegible]	[illegible]
60	46⅞	Data General	[illegible]	[illegible]
56⅝	47⅛	Datapoint	[illegible]	[illegible]
36¼	31⅝	Dataproducts	[illegible]	[illegible]
88½	81½	Digital Equipment	[illegible]	[illegible]
41½	35	Eloc Data Sys	[illegible]	[illegible]
[illegible]	[illegible]	Gen Automation	[illegible]	[illegible]
60⅝	44⅞	Harris	[illegible]	[illegible]
86⅞	81⅝	Hewlett Packard	[illegible]	[illegible]
103½	93½	Honeywell	[illegible]	[illegible]
33¼	33	Intel	[illegible]	[illegible]
67½	61¼	IBM	[illegible]	[illegible]
80	66⅛	Litton Ind	[illegible]	[illegible]
31⅞	18⅞	MDS (Mohawk Data)	[illegible]	[illegible]
15⅞	13¾	Mngmnt Assist	[illegible]	[illegible]
12⅛	10½	Memorex	[illegible]	[illegible]
21⅞	18	Modular Comp	[illegible]	[illegible]
78¼	60⅞	Motorola	[illegible]	[illegible]
38¼	30¼	National Semi	[illegible]	[illegible]
73	57⅞	NCR	[illegible]	[illegible]
31	27⅞	Perkin Elmer	[illegible]	[illegible]
35⅞	26⅝	Prime	[illegible]	[illegible]
107	94	Raytheon	[illegible]	[illegible]
30⅝	25⅞	Signal	[illegible]	[illegible]
[illegible]	51¼	Sperry Corp	[illegible]	[illegible]
20¼	18¼	Storage Tech	[illegible]	[illegible]
45	40⅞	Tandy	[illegible]	[illegible]
113½	103	Texas Instruments	[illegible]	[illegible]
45⅞	41¼	Tymshare	[illegible]	[illegible]
37	31½	Wang Lab B	[illegible]	[illegible]
14¼	12	Wyly	[illegible]	[illegible]

The table shows the closing prices in London on Friday and in America on Thursday. The share index is based on the prices of the UK companies in the table. Highs and Lows have been adjusted where necessary.

** Shares traded under the Unlisted Securities Market or under Rule 163(2)(a).*





Data Logic sales leap up 75%

DATA Logic, the London based subsidiary of American giant Raytheon, has revealed a 75% growth of sales for its products, from £11.2 million in 1979, to £19.6 million in 1980.

The figures also reveal that Data Logic had an operating surplus of £1.3 million for the year. The operating surplus in 1979 was £0.7 million.

The revelations by the subsidiary are unusual in the UK, where many overseas companies do as little as possible to display the figures relating to their British operations.

The Raytheon group in the UK includes Cossor Electronics, Badger Engineering and Sterling Cables and Electrical Installations. Data Logic increased the number of employees on its payroll by 200 in 1980, bringing the total UK payroll to 700.

Managing director Thomas . . . sees increased opportunities in 1981.

Despite the recession the UK managing director, J. Aland Thomas, saw increased opportunities in 1981 for the company's blend of converging technology sales to the word processing and terminal systems market.

Transaction Security gets £½m

TRANSACTION Security, manufacturer of Verisign, the microprocessor-based system for automatic cheque signature verification, has received a £500,000 injection of capital from Technical Development Capital TDC, which is part of Finance for Industry.

The money made available to TSL is to enable the company to pursue its international marketing drive for the Verisign system.

by Kevin Cahill

Computer sectors highest paid despite lack of unions

THE two highest paid sectors of industry for the years 1978/1979 were computer equipment manufacturing, with an average wage of £5,965, followed closely by the computer services industry with an average wage of £5,853.

These figures have emerged in the latest industrial performance analysis figures* released by the business ratios division of Inter Company Comparisons Ltd.

The compilers of the statistics note that these two sectors of industry "do not have high union density", a factor which the compilers felt might have contributed to higher than average earnings in other sectors.

They noted that IBM successfully beat off an attempt to unionise the company during the period covered by the statistics.

Among the top 200 companies in the UK in terms of return on total assets employed, LCA Computer Services came tenth with a return of 69.7% on total assets employed (RTA). There were 10 computer companies among the remaining 190 companies, and such well-known organisations as Knight Computer Services (27th, 48.8% RTA), Scicon (43rd, 45.5% RTA) and Data Logic (62nd, 41.5% RTA) appear high on the list of outstanding performers.

In further tables the computer equipment manufacturing sector came fifth in the sector league in terms of return on capital employed. The return on capital for the sector was 29.6%, only 4.4% behind periodical publishers which scored top place with 34%.

Electronic component manufacturing was 10th in the league with a return on capital of 25.9%, and electronic equipment manufacturing came 15th with a 23.3%. Down the list in 64th place with a return on capital of 13.7% was the telecommunications sector.

In the services sector, computer services came sixth with a return on capital of 29.1%, against employment agencies which came top with 64.1%.

The computer and electronic sectors show up well in terms of exports as a percentage of total sales. Computer manufacturers in this country exported 33% of their total sales; electronic equipment manufacturers 31.7%. Telecommunications was reasonably well represented with 19% of total sales exported.

The comparison on average remuneration showed that computer equipment manufacturers were the highest paying employers overall, with the computer services industry second. Telecommunications came out in the lower half of the manufacturing industry league table with average remuneration of £3,878 per employee.

This may be because telecommunications includes the Post Office which has a large clerical and manual labour force. Nearly bottom of the league were electronic component manufacturers, who paid an average yearly wage of £2,675.

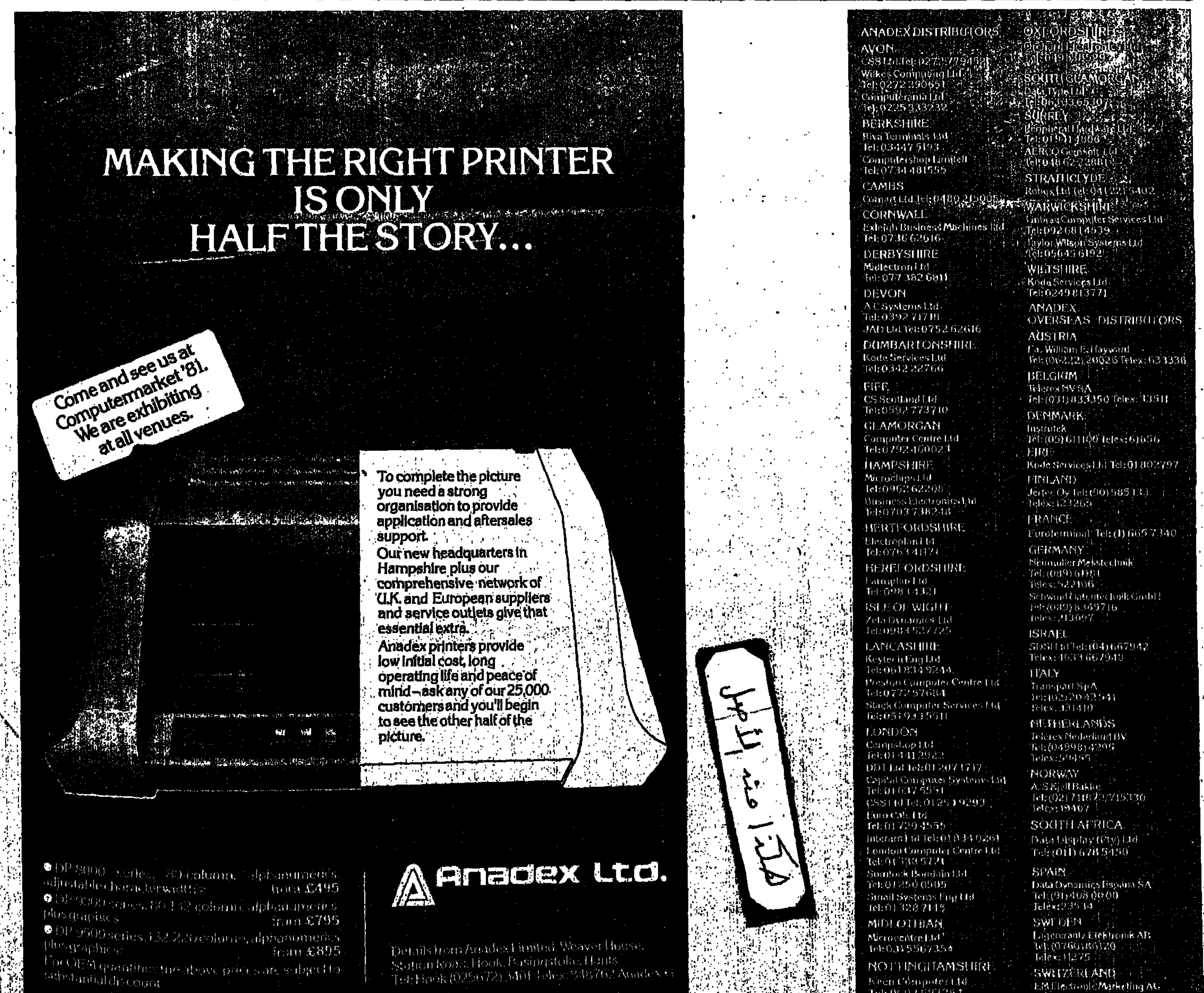
The survey goes on to look at the year-on-year performance of the various sectors within the industry groupings. Within the electronics industry this shows a steady rise in the real size of the computer industry in relation to almost every other industry.

Profitability in computer equipment manufacturing has risen steadily, from 12.3% in 1976/77 to 16.8% for 1978/79. The profit margin on sales has also shown a steady rise, from 9.8% in 1976/77 to 11.8% now. Profit per employee has shown a dramatic jump in the three-year period, from £2,973 to £5,308.

The best overall return on various assets was achieved by the component distributors who moved total profitability from 13.9% in 1976/77 to 20.6% in 1978/79. Profit per employee rose over the period from £13 in 1976/77 to £456 in 1978/79.

In the computer services sector, profit per employee rose from £1,826 in 1976/77 to £3,409 in 1978/79.

*The survey is available from ICC, 81 City Road, London EC1. Price £20.



MICHIE'S PRIVATEVIEW

Try playing the upside down trick with the objects of thought

"You are old, Father William", the young man said,
"And your hair has become very white;
And yet you incessantly stand on your head –
Do you think, at your age, it is right?"

"In my youth", Father William replied to his son
"I feared it might injure the brain;
"But now I am perfectly sure I have none,
Why, I do it again and again".

Lewis Carroll,
Alice in Wonderland

IT is doubtful whether Father William's youthful fears were medically justified. On occasion I would come upon my one-time colleague Rod Burstall quietly upended in meditation in a corner of his office. None of us noted any signs of injury to one of computation theory's outstanding brains. If anything, rather the reverse.

Less problematical are the beneficial effects of turning upside down not the agents but the objects of thought. In Douglas Adam's brilliantly perverse Hitchhiker's Guide to the Galaxy, the planet Earth and its human inhabitants turn out to be part of a vast scientific experiment planned and conducted by mice. So blatant an inversion of the accustomed relation between the two species administers to the brain a bracing shock, but probably no more.

Yet sometimes this kind of shock can end a harmful myth, and even open doors to new truth. This is particularly so when the accustomed relation is between ordinary people and the academic sociologists who conduct experiments upon them.

When the latter are probing the cognitive capacities of children, farmers, tribesmen, factory hands and the like, it is all too easy for the reader to forget to apply the upside-down trick.

The following account is by the USSR's great neuro-psychologist A. R. Luria, who died recently. He relates a dialogue with a villager of Uzbekistan in Soviet Central Asia. The time is 1931-2. Bracketed comments are Luria's.

"The following syllogism is presented: *'In the Far North, where there is snow, all bears are white. Novaya Zemlya is in the Far North and there is always snow there. What colour are the bears there?'*

A: *'There are different sorts of bears.'* (failure to infer from syllogism) The syllogism is repeated.

A: *'I don't know. I've seen a black bear; I've never seen any others . . . Each locality has its own animals: if it's white, they will be white; if it's yellow, they will be yellow.'* (Appeals only to personal, graphic experience). *But what kind of bears are there in Novaya Zemlya?'*

A: *'We always speak only of what we see: we don't talk about what we haven't seen.'* (The same.) *'But what do my words imply?'* The syllogism is repeated.

A: *'. . . Your words can only be answered by someone who was there, and if a person wasn't there he can't say anything on the basis of your words.* (The same.) *But on the basis of my words – In the North, where there is always snow, the bears are white; can you gather what kind of bears there are in Novaya Zemlya?'*

A: *'If a man was sixty or eighty, and had seen a white bear and had been told about it, he could be believed, but I've never seen one and hence I can't say. That's my last word. Those who saw can tell and those who didn't see can't say anything!'* (At this point a young Uzbek volunteered: 'From your words it means that bears there are white.') *'Well, which of you is right?'*

A: *'What the cock knows how to do, he does. What I know, I say, and nothing beyond that!'* "

Luria goes on to list what appear to him to be the villager's demonstrated incapacities for theoretical, verbal-logical thinking. The possibility does not occur to him that the peasant was too polite to state bluntly that he was not prepared to accept the major premise (that the bears in the Far North are white) from a young townee. Luria also overlooks that his subject has (very patiently) been using a perfectly clear syllogistic form of his own.

Major premise: Uzbeks don't talk about what they have not seen.

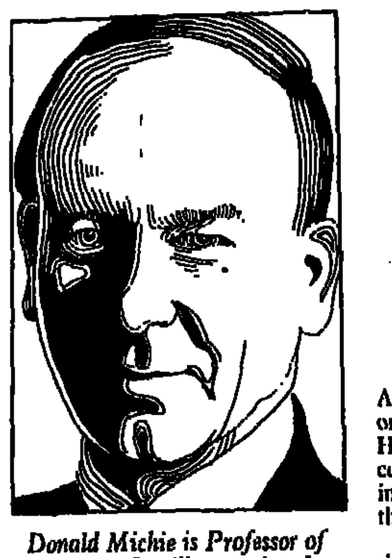
Minor premise: I, an Uzbek, have never seen a white bear.

Conclusion: I don't talk about white bears.

When there is a purpose in using logic (as in explaining unwillingness to commit oneself on the subject of white bears) the villager commands this intellectual instrument perfectly. His problem resides rather in Luria's apparent inability to follow theoretical, verbal logical reasoning! Yet the Uzbek is expected by the experimenter also to use logic as part of some kind of game, the purposes and rules of which are never put to him. Small wonder if, unaware of this, he concentrates on courteously threading a way past his visitor's obtuse and wooden repetitions.

First he assays a highly hypothetical flight (his "locality theory" of bear colour), only to have it categorised as an "appeal to personal graphic experience". Then he delicately hints that in *his* world large assertions (such as Luria's major premise) come more fittingly from senior members of the community – Luria was a young man then. Finally he resorts (in vain) to subtle and vivid analogy ('What the cock knows how to do, he does . . .')

An Uzbek fly on the tavern wall that night overheard this same villager telling about his day.



Donald Michie is Professor of Machine Intelligence in the University of Edinburgh.

"A professor of some sort. Knows about bears, or thinks he does. But he was as thick as two planks – couldn't even follow a simple syllogism. Don't know what they teach them these days!"

The young Luria went on to make scientific history with what are now classical studies of brain-localisation of cognitive functions. So what they taught them in those days cannot have been all bad, even though it seems not to have included the upside-down trick!

Donald Michie

REFERENCE

Luria, A. R., *Cognitive Development: its Cultural and Social Foundations.* Translation published by Harvard University Press, 1976.

FOCUS

Outbreak of rashes on the DP scene

AT A recently held UK conference on health hazards, the organisers, HUSAT, revealed that they had considered every implication of the impact of computer technology for the past ten years.

It would seem rather surprising that it has taken the authorities so long to discover possible harmful effects of VDU screens.

While experts argue over the question of what is a safe radiation dosage, most DPMs could diagnose the problem with or without tables covering degrees of screen luminescence, the number of milliwatts per square centimetre of screen or levels of infra-red radiation generated by the VDU.

As Op Spot's Paul Fisher suggested (CW, Jan 15), most VDU problems stem directly from task-inherent demands. This diagnosis covers boredom, fatigue and discomfort from poorly designed seating.

One report indicated a turn for the worse, however, with an apparent outbreak of rashes in the UK and Norway. No doubt the ever-vigilant ASTMS officials are already hard at work inputting the latest rash data.

Only time will tell whether the next report will call for a ban on light pens or photosensitive screens plus a call for the return of the card punch and mag tape encoders.

In fact, the spreading concern over VDU rashes is mild compared to that of a year or so back when concentrated doses of VDU radiations were expected to produce dizziness, posture strain, eye strain and even blindness.

The industry seems fairly well split with the VDU Eye Test Advisory Group stating firmly that there is no evidence that display units contribute towards eye strain or similar damage.

Balancing this placid report is that of the banking union which suggests that many VDU operators have to make lavish use of valium and librium.

If this is the case, the headaches will be transferred swiftly from the operators to the DPM, as he tries vainly to discover why workflow is in relaxed mode.

In any case, it is about time some attention was given to the DPM. Anyone keen to get to grips with some field research on strain, stress, tension, grind, exhaustion and fatigue would find an admirable combination of all factors sitting behind the DPM's desk.

A complete research project could be set up with contributions from the computer industry's "Gang of Four" – the BCS, CSA, NCC and IDPM.

The major problem which will face the team will be that of pinning down the DPM.

Diagnostic testing time would have to be slotted in between the DPM chairing steering parties, settling data input and control demarcation disputes, mollifying agitated user groups, nursing temperamental system teams and threatening the restive programming section.

Between these tasks the DPM will be rushing off to the latest installation hotspots – the air vent above the line printer and the new temporary operator who is insisting on her rights in respect of the rest-room darts board.

Even when the medical team does catch up with the DPM, it will be unlikely to gain his full attention.

With one eye on his pending files, one hand on the phone and his mind on the forthcoming budget meeting with the company accountant, the DPM is unlikely to be able to give his undivided time to the project.

Thermometers used on such occasions will undoubtedly register a hefty degree of concern, pulse rates will race and eyes will glaze as the DPM tries hard to concentrate.

Datasaab has been busy recently promoting the benefits of exercising at the workstation as a method of relieving backache and [illegible] among VDU operators.

The DPM must be excused any ergonomic activity on the grounds that he already gets more than his full share of the action.

Alan Simpson

14 YEARS AGO

From Computer Weekly of March 2, 1967 (this column temporarily replaces our Ten Years Ago feature, due to the postal strike in February and March, 1971, which resulted in the suspension of Computer Weekly distribution):

ICT announced a £580,000 order from the Scottish Gas Board for a 1905F installation, bringing the value of total orders for that fortnight to over £3 million . . . The top UK company in a list of the world's 100 biggest industrial users of computers was ICI, with installations worth £5 million . . . IBM announced a successful process for the manufacture of integrated circuits from germanium with measured switching time of 350 picoseconds – faster than any known silicon circuits . . . The first online real time computer control system for continuous hot strip steel production in Japan was developed by Toshiba . . . A real time compiler for the Coral language was produced by CAP for the Ferranti MF1600 computer . . . Following the merger between Royal Typewriter Co and Imperial Typewriters, production facilities of the Datalog division of Imperial were to be set up in Leicester . . . For the twelfth consecutive year NCR's worldwide revenue from sales, services and equipment rentals showed an increase and established a record. Total revenue for 1966 was £311,100,000, an increase of around 18% on the previous year.

DOWNTIME

A foot in the royal door

YOU may have wondered how the top Australians' paper The Times was able to scoop the world a day ahead with the happy news of Prince Chas. and Lady Di. I can now reveal how it was done.

You will recall the Prince expressing his fear that his phone calls to Lady Di on holiday were tapped. They were.

Attached to the phone line was the wonderful world-beating continuous-voice recognition system discovered last year by crusading journalist Duncan Candle. To save anyone having to listen for hours to endless tittle-tattle about point-to-points and how wind surfers do it standing up, the machine was programmed to catch key phrases such as "Marry me", "Splice the knot", "Get hitched", "Do the right thing", and so on.

Candle regards this foot in the door of The Times as a means of starting to get his message across to the British ruling classes.

What he has failed to notice is that Digger Murdoch intends to dispose of this readership and replace it with women and the young, who as we know are downtrodden and therefore not ruling. Too bad, Dunc. Still, you got some new technology actually working in Gray's Inn Road – amazing.

What The Times did not discover was that Lady Diana gave up a promising career in data processing to become Prince Charles' helpmeet. Before falling in with the Prince last summer she was planning, in common with all her fellow school-leavers at a loose end, to take a Threshold course and become a Cobol programmer specialising in maintenance of payroll and nominal ledger systems.

Now she will have to give up that rosy future and spend her time in such boring pursuits as going to balls and star-stuffed charity galas, opening breweries and commemorative benches and the like.

(How do you open a bench, by the way? A distinguished literary gentleman of my acquaintance was faced with this problem when asked to open a bench in Dublin dedicated to James Joyce. In the end he made a short speech and then said, "Now I am going to have the first sit," proudly doing so.)

Anyway, I don't suppose Lady Di had much choice. What else can a young person with few qualifications do these days apart from taking a Threshold course or becoming Princess of Wales?

Some people feel differently about it though. Lady Jane Wellesley is understood to have turned down the Prince's proposal. When he asked her, "Why don't you want to be Queen of England?" she is supposed to have replied "No chance of promotion, darling!"

"I think you chose the wrong character to personalise the voice synthesiser."

Measuring up to metrication

ONE of the refreshing things about Americans has always been their refusal to have any truck with this metrication nonsense. They have succeeded in fending off the change partly because a long time ago they made the Imperial system much more manageable by getting rid of stones, quarters, hundredweights, rods, perches and so on.

However, their companies are having to quote metric specifications for this international world now, and oh what chaos can ensue.

On the back of the data sheet for Wang's Minidiskette Workstation, part of the new super-cheap word processor range, are given the measurements of the unit. These are dutifully translated into metric thus: Height . . . 15,9 in. (6.26 cm.).

Huh? we all cry. I always thought centimetres were smaller than inches, not bigger. Maybe they have a special midget-sized model for diminutive Europeans. But no, it turns out that someone has divided by 2.54 instead of multiplying.

Tut, lose ten marks.

Indeed, Wang has noticed this and issued a correction sheet. Height is now 15,9 in. (40.4 cm).

Ah, but how about the weight? On the original the display weight is given as 66 lb. (9.98 kg.). [illegible] again? Then the keyboard weight is 6 lb. (4.54 kg.).

Now hold on a minute!

I have waited a few minutes to let the turbulence in my mind settle. I have looked back at the paper, and my mind has clogged up again. There seems to be a non-linear relationship between pounds and kilos.

Interesting – is it all to do with Einstein and Riemannian geometry?

I look at the correction sheet and there is no mention of weight at all, so it can't have been an error!

Arrrgg! For goodness sake don't anybody write in and start explaining to me the difference between MKS and Systeme International, or I shall definitely blow several fuses (2A S.B. @ [illegible] VAC).

ComputerWeekly

Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS

Thursday, March 5, 1981

Revolution at a snail's pace

PUNDITS ARE forever telling us that automation will revolutionise the office far more than it has manufacturing. This puzzles many people, in that the word processing revolution seems to be taking an awfully long time to happen. It is, however, perfectly understandable that potential users are hesitant about embracing the new technology when the potential benefits are so hard for the uninitiated to measure.

How much does a word processor increase productivity? The question is not quite as difficult to answer as "How long is a piece of string?", but almost. Any one report on the subject quotes widely-varying producivity improvement figures and then, when different reports are compared, the poor customer probably gives up in despair.

The Central Computer and Telecommunications Agency report in 1979 on the Darlington word processor experiment provoked a storm of protest with its overall conclusion that the machine in question was not cost-effective. The latest report, on stand-alone machines (see page 2), will probably produce a similiar reaction even though its conclusions are not so damning.

After Darlington, there were forceful accusations that like was not being compared with like; that the existing automatic typewriter operation was smooth-running and efficient, while the new installation was plagued with hardware problems and failure of training.

Procedures were kept the same with the word processor as with older machines, it was claimed, while new technology necessarily entails new ways of doing things. There have even been doubts expressed about civil servants' skills in work measurement, certainly an arcane subject.

How many of us can pass an educated comment about the relative merits of Treasury Typing Units versus Equivalent Square Inches of Typing? Still, these doubts mean we cannot accept uncritically judgments made by the CCTA such as that which suggests word processors are no faster for initial typing than typewriters.

A consultant will immediately call out "Rubbish! The WP is 11 per cent better!" and prove it. Never mind that another consultant will promptly say 15 per cent.

The civil servants are hampered in their task by ever-falling prices that make cost-effectiveness judgments difficult. They claim that their relatively low productivity increases stem partly from the fact that their operations are already very efficient.

Yet after all this work they have not come to grips with the really interesting questions, such as how shared-logic compares with stand-alone? Whose machine is the best?

Sadly, there is no getting round the adage: *Caveat emptor.*

Budget day

BUDGET day, alas, is not Christmas day and neither is Mrs Thatcher Santa Claus. On that basis there seems little point in assembling a list of computer company goodies which should be in the Chancellor's speech next Tuesday. Suffice it is to say that, in the inimitable words of Peter Sellers in his film Being There (slightly paraphrased), 'plants which aren't cared for and watered don't grow'.

Let's talk in her terms, and instead of asking for the interventionism Mrs Thatcher finds so abhorrent simply inquire if she won't create the financial and industrial environment in which this relatively infant industry can flourish.

The computer industry in this country has generated more than its fair share of good ideas, only to see many of them sold and exploited abroad. A major reason for this export of nascent technology has been the lack of positive reward for the innovative in the form of increased wealth, and a negative incentive in the form of oppressive taxation, says Mrs Thatcher.

But she still has to find a way of keeping her election promises that the wealth-creators will keep a share of the rewards. And that begs the higher issue of how many rewards there are when British industry is contracting around their ears.

1984 and all that . . .

THIS week's example of the strange things people say about computers was sent in by P. G. Johnson of Tetbury, Glos, who wins £5.

Question: what are Algol, Cobol, and Fortran?

Answer: Tranquillisers.

– Contestant in "Brain of Britain 1981", BBC Radio 4

LETTERS

Why has software industry shunned the patent system?

IN a recent perspective article in Electronics Weekly much play was made over the substantial part played by patents as one of Britain's big invisible earners. It is particularly unfortunate that the UK software industry does not make as much use as it could of the patent system to protect software products, particularly as one is led to believe that our software profession has an international reputation for innovation.

I am a member of the Law Specialists Group of the BCS, and I should like to hear why the software industry has turned its back in such great numbers on the patent system.

I accept that the patent systems of the world have had great difficulties in accommodating software probably out of ignorance, but it is now fairly well accepted in IPR circles at least that although computer programs *per se* are not patentable, adequate patent protection for software inventions can be obtained in the UK and maybe Europe by protecting the software product when operating using the inventive software.

Although this may at first sight not cover infringement by an unlicensed party providing its version of the patent protected software in written, disc or cassette form, the new UK Patent Act includes, at Section 60(2), what is called contributory infringement which can be used effectively to cover that situation.

The Commission of the European Communities is currently interested in hearing whether existing legal protection systems for software are adequate or not and I would like to know why the patent system is shunned by members of the software industry who generate inventive software, so that I can make a meaningful reply to their question.

R. J. HART

Woolton
Liverpool.

Jargon critic biter bit

IN Computerview of January 29 you lamented the frequent misuse of jargon within the DP industry. All too often, you argued, jargon is used "to give the appearance of significance where true significance is either being hidden or was lacking to start with."

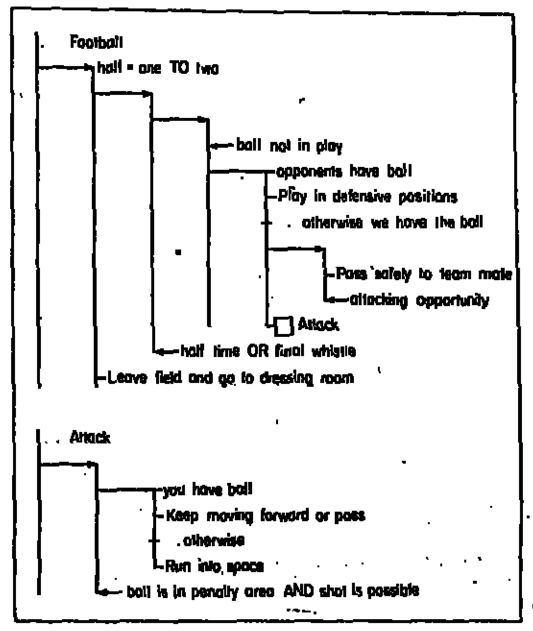
Computer Weekly of February 12 provided a marvellous example to illustrate this point. In his article on viewdata technology, Mike Aldrich wrote: "With computer devices, reductions in cost and lowering the knowledge threshold of the user result in the multiplication of market potential".

Surely what he meant was: As computer devices become cheaper and easier to use, more people will buy them.

DAVID RADO

Archfield Road,
Cotham,
Bristol 6.

All those boxes are a bind!



WHY do we put boxes around things? Indeed, why do we use flow charting notations of any sort which are a bind to draw (and must be a printer's nightmare)?

After several years' experiment I have defined a simple notation which provides for the three primary "structures" components, namely Sequence, Selection and Iteration. To illustrate I take the liberty (see left) of adapting an example from Mr Atherton's interesting article on Comal (Software File, January 21).

It is, I trust, almost self-evident that a vertical line represents a sequence (always executed downwards). A right pointing arrow represents the start of a sequence which is iterative. A left pointing arrow shows on what conditions and at which point an iteration terminates (alternatively a count may be given at the head of the iteration). Horizontal lines crossing a vertical line divide it into alternative sequences which are mutually exclusive on any given pass. The selection conditions (IF, CASE or whatever) are shown against the crossing lines.

I would like to acknowledge the work of E. Richards and N. Rothon whose ideas pointed me in what I trust is the right direction.

R. J. BOWERS

Loughborough.

Working from one's home

I AM at present employed as a computer programmer by a company in a nearby town. However, as I live in a rural area, I should very much like to work at home.

I understand that organisations exist which employ programmers who work in their own homes but I have been unable to trace the names and addresses of any such companies.

I should be grateful if you would let me have the names and addresses of any companies employing programmers to work at home or, alternatively, advise me of any publication from which I would be able to obtain this information.

PROGRAMMER

Cambridgeshire.
(Replies via the Editor please)

Sub-contracting makes sense

IN response to the letter from Elizabeth Last of ABS Computers (*CW*, February 19), I would like to suggest the following alternative: There are several technical consultancies which have been established to undertake contract research and development. These are typically of use where companies do not have the in-house skills to undertake the R&D themselves; or as in the case of ABS Computers, have been unable to recruit sufficient staff of the appropriate calibre.

I accept that software related projects are usually both difficult and challenging, and that in some cases it is impractical to sub-contract them.

However, the alternative is there, and in times of economic recession, sub-contracting makes sense.

J. BROTTON
Managing Director

Syscon,
Cambridge.

Good trainee can help

IN reply to B. T. Skinner (Letters January 29) firms do not "offer positions for job experience"; like the rest of us they are busy enough wrestling with their own problems. However, that does not mean that they are deaf to representations from the right quarter.

Colleges which have good relations with local industry – as all the colleges offering the Threshold course have – are able to convince substantial numbers of employers that a good trainee can even help to minimise their problems.

It would be worth Mr Skinner's while making enquiries with the college offering the National Diploma course.

GEORGE PENNEY
Careers Projects Manager
NCC, Manchester.

The Editor welcomes letters commenting on subjects published in Computer Weekly, or on original topics. All letters must be accompanied by the writer's name and address, not necessarily for publication. Letters may be cut.

Liveware File by Don

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OP SPOT

by Paul Fisher

A day on the Thames Valley 'cop op' beat

The Kidlington computer room. PC Keith Rivers is the one changing the disc pack, and the policeman at the keyboard on the left has recently retired. Site security is tight. Note the closed circuit TV camera and the lack of windows.

COP OPS is the tempting, but misleading, tag for the five police constables who look after the Thames Valley Police Honeywell 6025 computer. Their immediate boss, Inspector Brian Squelch, says: "They are operators, but they are more than that. First of all they are database managers."

He went on to explain that database management at this site involves tasks such as calling back records, suggesting and implementing ideas for improvement and checking the quality of the information which is being put into the computer.

Unlike most operators, the police operators have a close understanding of the data being processed. The issue of whether these ops should be involved and knowledgeable about the business beyond the computer room does not arise because they are, above all else, policemen.

"All policemen," says Superintendent Hedges, the man with overall responsibility for the computer, "do some sort of specialised work."

Operator PC Keith Rivers adds: "I never see myself as anything but a policeman. We're all policemen here and aware of each other's problems."

They wear uniforms on shift and their grades are set according to police rather than DP structures. A problem that Supt. Hedges faces, common perhaps to many DPMs, is that it is "difficult to give promotional ambition in a small unit".

Full 24-hour cover is given and the ops work to a five-week cycle. One person covers for the night shift which runs between midnight and 8am. The police are well used to working shifts so there is no question of special shift premia.

They are all volunteers and, says Supt. Hedges, "committed to the job. Their expertise is incredible. The PC ops are more important than I am."

As far as skills go, they are mostly self-taught and any formal training is handled by Inspector Squelch.

Ethel is the nickname given the computer. When the machine was installed the Home Office and Honeywell gave some instruction but most of the training was a matter of asking questions and following instructions.

"A lot of it is so repetitive," says one of the PCs, "that we don't need much training. The best way is hands on."

He continued: "In any eight-hour shift we only spend an average of two hours actually operating." The rest of the time they are working on database management tasks.

There is no strict division of labour at the site. For instance, Inspector Squelch says: "There's no way I'd refuse to do a tape mount just because of my rank."

How many other ops managers do the same? "All police work is team work," says Inspector Squelch.

David aims for his 'spare time' degree within five years

David Martin – OU student.

PICTURED in the computer room at Leicester County Council's Univac 1100/10 site is Keith Martin. Apart from being an operator, he is also a student with the Open University, and has just finished his first year of study.

So far he has found the ground he has covered is familiar from his science 'A' levels, and reckons that he has been working "comparatively few hours, perhaps 10 or 15 hours a week".

The pace will quicken now that he has started statistical and computing courses.

An OU degree is as hard to get as a degree from a conventional university, so students are allowed to spread their studies over a number of years. *Martin* plans to have his degree within five years.

His employers are paying the £98 annual tuition fee.

A survey of 38,000 of the 40,000 people who have graduated from the OU reveals that 80% said they had benefited from their studies either by better pay or improved skills.

Although a degree is usually required by Leicester County Council to become a programmer, Martin says: "Programming doesn't attract me". He is aiming for some kind of management role.

One of the most successful OU graduates also works in DP as an analyst. Since 1975 Eddie Deeks from Coventry, has accumulated nine credits in subjects such as linear mathematics, mechanics and applied calculus, quantum theory and atomic structure and numerical computation.

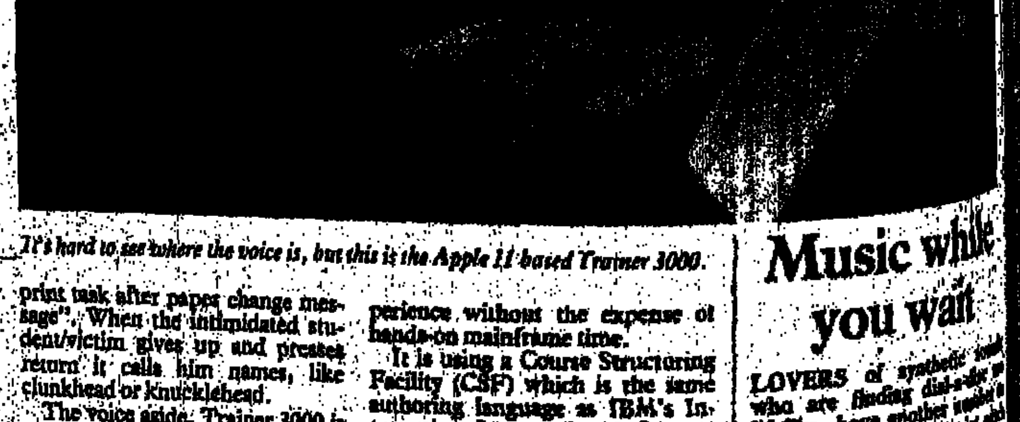
Machine that answers back

PERHAPS the ultimate in voice synthesis and recognition will be a system which recognises a lisping Frenchman muttering "synthesis".

Trainer 3000 (pictured right) is an American operator training aid billed as a "portable, voice response microcomputer". In fairness it doesn't aspire to the French test. However, Computer Systems Research, the Connecticut company which devised the package, fails to elaborate on whether the system responds to your voice, or you respond to its voice, or both. This last is usually called a conversation.

What the voice does, apparently, is to "personalise and humanise the feedback on student responses". I would think the effect would be the opposite. In all likelihood it has a mid-Western Dalek monotone reminding the student that it is an IT and neither human or personal. But I haven't actually heard the thing.

With the authoritative tone of an operations manager it might boom something like, "Reactivate the print task after paper change message". When the intimidated student/victim gives up and presses return it calls him names, like clunkhead or knucklehead.



It's hard to see where the voice is, but this is the Apple II based Trainer 3000.

The voice aside, Trainer 3000 is a repackaged Apple II dual floppy disc-based microcomputer with software and course books to teach system operation and problem resolution for JES3/MVS. Courses scheduled for introduction later this year will cover training for 3081, 303X, 4300 and JES2/MVS systems.

It tests the students before and after they have completed a question and answer routine, and has the benefits of giving keyboard experience without the expense of hands-on mainframe time.

It is using a Course Structuring Facility (CSF) which is the same authoring language as IBM's Interactive Instructional System (IIS). This means that courses can be written and sat on both the Trainer 3000 and the IIS.

Inhuman voices are wide open to imaginative sabotage. There was once an obstinate mynah bird caged in a Swansea park. It resisted all attempts by successive generations of sixth formers to teach it to slander a local headmaster and a certain lady. Speech synthesis could have made a vital contribution.

Music while you wait

LOVERS of synthetic ... who are finding dial-a-... lifelike, have another ... try. It's a trick for a ... during the night shift because the number is an American one.

010 1 609 662 2070 will connect you with the politest of ... operators from ... fishers. Ask her a question which is difficult to answer and you'll be put on hold. At this point some Muzak is switched on to ... gloopy to hum along to ... worse than normal ... crackle.

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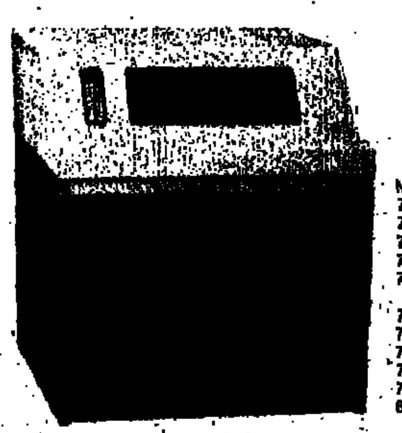
EX-STOCK

Centronics



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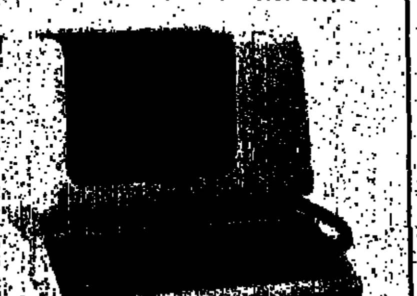

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PROGRAMMERS PAGE

by Pamela Rowe

Ops is a good route into the 'closed shop'

AS a follow-up to J. M. Perry's plea for advice on how to break into computing, and my five-pronged attack plan, I have received another suggestion from a DP manager who prefers to remain anonymous.

He writes: "Take a job as an operator or data controller in a small or medium-sized installation, learn all you possibly can about the systems and let the DP manager know you are keen on progressing into programming.

"Most programmers are only too happy to assist operators who show an interest in their work, and demonstration of the ability to solve simple bugs would soon stand the operator in good stead for any programming openings. I write as a DP manager who far prefers to take on a person well-known to me, as a programmer, than one unknown from outside."

Sounds like another feasible approach. But one word of warning: Beware of getting "stuck" in operating (with apologies to Op Spot). I have heard of disillusioned folk who spent some years trying that route with no marked success.

I think you would have to pick your company very carefully and be quite open about your ambitions from the start. If you were lucky, they too would be as honest and though you might not get the job – many employers prefer stability in a trained op – at least you would not be wasting your time.

Still on the subject of letters comes all you've ever wanted to say about the Boss but never dared to utter – a fairly scathing indictment which I would expect to draw some flak and fortune.

"For the past four years I have been working as well as circumstances allow, in a data processing department. In that time I have written programs for five substantial projects, and designed three of them.

"At this instant, only one piece of my code is in use, and it is due to be replaced because the accompanying software is not maintainable. Three of the projects were abandoned without ever being installed, after the programs for them were written and tested and documented.

"To a certain extent I suffer because it is known that I am a good programmer. This department has tackled a series of medium-sized interactive projects and management has given me parts in the most ambitious of them. One was cancelled because a section of it not involving me over-ran its budget. A second was conceived for the wrong hardware. The third was a bench test on a new computer, to check that it will do what it was bought for.

"I designed and wrote the tests and they are running nicely, and two of us were busy estimating the ultimate expected load, when it was decreed that the work should stop. We are now writing more programs when it is not at all certain that the computer can run them.

"The reason for all this confusion is quite simple. Management here knows very little about programming. Our constitution lays down that system designers shall be senior to programmers.

"The place is run by a few people who spent one or two years writing elementary commercial programs, and who then escaped into system design as soon as they could. They are just not competent to run a programming department.

"That would not matter, if they had adequate programming advice. However, they appoint their own advisers, and their main criterion is not knowledge and ability, but bonhomie.

"They do not deliberately miss ability. They simply do not know what good programming consists of, so they cannot recognise it or its absence. Once a single weak adviser has been appointed to a senior level, he appoints those to the level below him, and the institution is locked in rigid mediocrity.

"Management realise that something is amiss, but they do not know precisely what. Any junior programmer who tries to tell them is regarded as 'difficult', and lacking in bonhomie, so he is ignored.

"I do want to work well, but it is difficult when good programming practice is generally missing and one's own efforts seem to lead nowhere. Is my experience common?"

Anonymous again, though not surprisingly.

Mrs Steve Shirley, Vice-President (Professional) of the British Computer Society, holds out a welcoming hand to greet Kit Aston making his first public appearance as England's Chairman of the International Year of Disabled People at a reception organised by the BCS Committee for the Disabled.

Dastardly plot by the 'new bureaucracy'

THE editorial columns of Wireless World recently devoted 12 inches of space to "The new bureaucracy".

This conceals a strange attack on computer programmers, who besides being responsible for most of the world's evils (Wireless World's anyway) and establishing a stranglehold on computing from 1940 to 1980, are confusingly described as glamorous, twice, and "very well paid, to say the least, from the beginning".

Shades of green?

Strap on your seat belts for the main gist of this editorial, which takes off like a Batman adventure.

The nub of the argument is that programmers, ignorant of both the problem to be solved and the technology to do it, have become all-powerful; enough to stop any change in computer architecture.

This has been fixed for 36 years, since 1944, and now the wicked programmers have insisted that it is copied without improvement into today's microprocessors.

Going on from strength to strength, they "developed a glamorous view of themselves", made inroads into the media, and conserving their technical naivity took no interest in the paying customer, who meanwhile was clamouring for a mechanical solution to his problems (knowing, of course, *exactly* what he wanted).

Take a deep breath, we haven't grounded yet.

The coup came when Satan and his team of code-crunchers "introduced in classic style an informational bureaucracy between machinery and problem to be solved, and insisted (again) that any link between the two must be via the mandarin language devised in the 1950s."

Has WW never heard of supply and demand, or is that a little too modern? The *demand* for an interface between man and machine necessitating a programming language, and leading to *supply* of a new skill, programming, to handle the language. Not the paranoically opposite view of an exclusive sect of programmers devising secret codes to keep out the world.

I hardly think, either, that we can thank the programmers for introducing to society the concept of "information processing", as is imputed. I feel some small recognition is due to the roles of psychology and engineering, and the research studies undertaken into the subject under both banners.

The point to all this high flying comes of course in the last paragraph of the editorial. A Minister of Information Technology is to be set up, and the WW cry is that this will merely institutionalise "the new bureaucracy".

It ends with a rather poignant appeal to the "technically uneducated, parasitic bureaucracy variously called information technology or computer science" to leave poor old electronic engineering alone so that it can get on and solve all the world's problems.

PUZZLER

THE integer 12 has the following property: X (the original number) plus the sum of the digits making up X, equals Y. Y, plus the sum of the digits making up Y, equals Z. And Z has the same digits as X, but in reverse order.

Does any other integer of two or more digits have this property? See page 47 for the answer.

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DATA ANALYSIS

Normalisation, or the relational approach

Section I – Part 20

of our series describing a system design methodology

by Rosemary Rock-Evans

THIS article will be dealing with the technique of normalisation. Normalisation is also known by the name of the relational approach, and originated from the work of E. F. Codd of IBM's research laboratory in San Jose.

The objective of normalisation is to obtain the highest level of data independence possible, or to put it another way: to ensure that any one entity has only one value for an associated attribute type and to ensure that each associated attribute type is describing the entity type in question, and not another, i.e. that it is not the identifier or the property of another entity type.

These two objectives should be familiar, as they are the same rules used in entity analysis.

The purpose of normalisation is to ensure that the work of updating, creating, retrieving and deleting attribute values is kept to a minimum, whether the effort is that of the computer or the user. It should also ensure that data is not lost because of artificial dependencies introduced into it, i.e. the resulting structures should be robust and consistent.

The building block of the relational approach is a *relation* (not to be confused with a relationship).

A relation is represented by a rectangular table of data values. Each column represents all the different values of an attribute type in the relation, each row all the values of the attribute types which are in some way related, for example, by belonging to the same entity type. However, at this stage the relationship is not known.

The rows and columns are given special names in the relational approach. A row is termed a *tuple* and in our example the row would be termed an 8–*tuple* because there are 8 columns. The columns are called *domains*, thus all the values under the Operation Time column form the domain of the attribute type "Operation Time." (These terms make no difference to the way in which normalisation is achieved, but it is useful to know their meaning since they are used by the proponents of relational databases.)

In Figure 1 an example of a relation is shown. We have used a report which was being produced for the hospital administrators. It was called the Doctors' Operating Schedule, and showed which doctors were scheduled to be present and/or perform at operations. It is unnormalised, because it cannot be represented by a pure and consistent data structure.

Certain rules governing the relation must have been followed before normalisation can proceed.

- Each attribute type must only occur once in the relation as a column heading.
- Each value of an attribute type must be consistent in its format and the attribute type name must be such that it does describe the value.

For example, it would be wrong to have operation date values of 02/80 and 03/02/80 under the same column heading and also wrong to have just "Date" as a column heading describing both dates of admission and dates of operations.

These points are usually taken care of by the fact that the forms, reports, etc, are usually structured in this way already.

The steps to normalisation are as follows: first, an identifier of the tuples must be found. Each attribute value (or group of attribute values) is examined to see if it (or they) identifies a tuple, and once the value (or values) is identified, the corresponding attribute type (or types) is underlined in the table. In our example, doctor number and operation number uniquely identify each tuple in our relation.

Next, remove repeating groups — the doctor number and doctor name are repeated within the relation (the report may in fact have omitted them, but the implication that they would have been repeated is still there).

The original relation is split into two, so that the repeating group only occurs once, and a new key is chosen to identify each tuple in the new relations.

In Figure 2 a relation with doctor number as a key has been created and a relation with a key of doctor number and operation number. The data is now said to be in *first normal form*.

Third, ensure that the values of the attribute types are fully dependent on all the key attribute type values. Several questions can be asked to determine this:

(a) If the complete key is changed, i.e. amended or deleted, etc, which attribute types are affected?
(b) If I change only part of the key i.e. each attribute type value making up the key, which attribute type values are affected?

The values in the Figure are intended to be used in deciding these points.

For example, if I change or delete Operation Number BA1598/040280/1030 it looks from the values as though I would have to change the operation time and date, the patient name and the date of admission. All information on Operation LP1654/150280/1300 is erroneously lost if I delete doctor 13855.

The relations are again split so that all the attributes are dependent on the key items. The result is as shown in Figure 3, which is said to be in *second normal form*. Note we have found no attribute types dependent on the full doctor number/operation number key. The resultant Operation relation contains no duplicated operation numbers, in other words duplicated rows are removed as part of the process of normalising to 2NF.

Finally, remove all attribute type values "transitively" dependent on other attribute type values. Again, the data values are intended to show where "transitive dependence" occurs. From Figure 3 it appears that the date of admission is dependent on the patient name because repeating groups of values occur. The attribute types which are related are removed from the relation and one chosen to identify the resulting tuples.

In Figure 4 the resulting relations are shown. Patient name has been chosen to identify the tuples which have resulted.

The relations are now said to be in *third normal form*.

Fourth and fifth normal forms have been invented by people other than E. F. Codd, but these two forms place a very high reliance on an interpretation of the patterns of the data values. This may be sheer coincidence, and it is for this reason that they have not been discussed in this article.

It is possible to convert the relations into an entity model using the following steps (see Figure 5): place the relations with the fewest keys at the top of the page; where a key occurs at two levels replace the lower level key by an empty box and a line representing a 1:N relationship; where an attribute type occurs in one relation as a key and in another as a non-key, replace it by a 1:N relationship.

Thus relations can be converted to a model, and similarly the model can be converted back to relations (this will have some bearing if implementation is being planned using a relational database).

This article has concentrated on normalisation as a technique which can be used to verify entity analysis. CACI does not use normalisation in isolation to produce entity models and determine attribute types. In the company's methodology it is used to reveal any erroneous relationships between attributes of an entity type that have been missed, determine which attribute types could be used as keys (if these are not known) and check and verify that the model includes all entity types and all necessary relationship types.

Since it is a widely used technique, it is important to understand the limitations of the approach. The disadvantages of normalisation are as follows:

a) It is impossible to identify an entity type from a relation unless a possible identifier is present, or only one attribute type of the entity type (its key, say) is present.
b) A basic understanding of the attribute types must have been gained before normalisation can take place. Although normalisation is supposed to rely on data values, it is dangerous to assume that information can be deduced using the data values alone without any knowledge of the entity types or attribute types. If normalisation is used with no knowledge of the business, sheer coincidence can result in completely erroneous results.
c) The types of information generally used for normalisation e.g. reports, forms, existing computer record contents, can give misleading information about the entity types and relationship types in a business. A report is, after all, a combination of data extracted from knowledge of entity types and relationship types. The extraction process need not necessarily maintain the original structure.

For example, normalisation of a report showing the patients due to attend a clinic session would result in a relationship type between a patient and clinic session. We know from the model that this is redundant and is derived by knowing the appointments the patient has. In other words, the relational approach can introduce redundancy.

d) However much normalisation an analyst does, there are some relationships and entity types which never appear. This is because the reports and forms, etc, are again the limiting factors.
e) Normalisation can be a time consuming task. It is better to use it for verification, rather than as the main analysis tool, simply because so many redundant relationship types can be found, which then have to be eliminated. In other words, much more effort is required for normalisation than for entity analysis to give the same results.

The advantages of normalisation are:

a) It is a mathematical step-by-step approach for people who feel more comfortable using mathematically based methods for analysis (but note the point made above, that reliance can never be placed on normalisation alone).
b) It is useful as a checking and verification tool.
c) It may provide information on, say, possible keys which may not be available from any other source.

In Part 21 we will start to look at some of the application design considerations affecting the mechanism for implementation.

The Data Analysis methodology was developed at CACI by Ian Palmer.

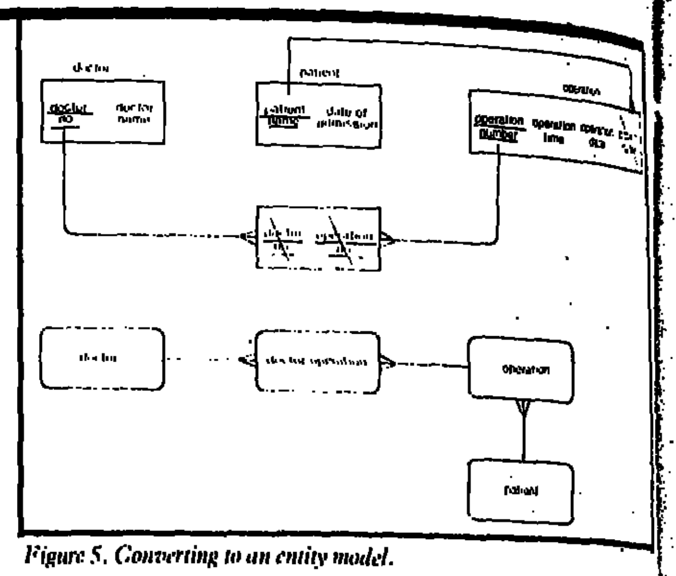

Figure 5. Converting to an entity model.

REPORT NO 24 — BRIGHTHOLMLEE COTTAGE HOSPITAL — DOCTOR'S OPERATING SCHEDULE — DATE PRODUCED 22/1/80

Doctor No	Doctor Name	Operation number	Operation Time	Operation Date	Patient Name	Date of Admission
18654	Dr J. Smith	AA1234/040280/0830	08.30	4/2/80	M. Mouse	20/1/80
18654	Dr J. Smith	BA1598/040280/1030	10.30	4/2/80	A. Morrow	11/1/80
18654	Dr J. Smith	FG1965/040280/1600	16.00	4/2/80	J. Durrant	25/12/79
18654	Dr J. Smith	AA1234/150280/1800	18.00	15/2/80	M. Mouse	2/1/80
13855	Dr J. Hyde	LP1654/150280/1300	13.00	15/2/80	M. Thatcher	5/1/80
18592	Dr L. Baker	PP9909/180280/1400	14.00	18/2/80	J. Joyce	4/1/80
18592	Dr L. Baker	BA1598/040280/1030	10.30	4/2/80	A. Morrow	11/1/80
18592	Dr L. Baker	FG1965/040280/1600	16.00	4/2/80	J. Durrant	25/12/79

Figure 1. The unnormalised relation. No 18654 Dr J. Smith, and No 18592 Dr L. Baker occur in repeating groups.

DOCTOR

Doctor No	Doctor Name
18654	Dr J. Smith
13855	Dr J. Hyde
18592	Dr L. Baker

DOCTOR OPERATION

Doctor No	Operation Number	Operation Time	Operation Date	Patient Name	Date of Admission
18654	AA1234/040280/0830	08.30	4/2/80	M. Mouse	20/1/80
18654	BA1598/040280/1030	10.30	4/2/80	A. Morrow	11/1/80
18654	FG1965/040280/1600	16.00	4/2/80	J. Durrant	25/12/79
18654	AA1234/150280/1800	18.00	15/2/80	M. Mouse	2/1/80
13855	LP1654/150280/1300	13.00	15/2/80	M. Thatcher	5/1/80
18592	PP9909/180280/1400	14.00	18/2/80	J. Joyce	4/1/80
18592	BA1598/040280/1030	10.30	4/2/80	A. Morrow	11/1/80
18592	FG1965/040280/1600	16.00	4/2/80	J. Durrant	25/12/79

Figure 2. First normal form.

DOCTOR

Doctor No	Doctor Name
18654	Dr J. Smith
18592	Dr L. Baker
13855	Dr J. Hyde

DOCTOR OPERATION

Doctor No	Operation No
18654	AA1234/040280/0830
18654	BA1598/040280/1030
18654	FG1965/040280/1600
18654	AA1234/150280/1800
13855	LP1654/150280/1300
18592	PP9909/180280/1400
18592	BA1598/040280/1030
18592	FG1965/040280/1600

OPERATION

Operation No	Operation Time	Operation Date	Patient Name	Date of admission
AA1234/040280/0830	08.30	4/2/80	M. Mouse	20/1/80
BA1598/040280/1030	10.30	4/2/80	A. Morrow	11/1/80
FG1965/040280/1600	16.00	4/2/80	J. Durrant	25/12/79
AA1234/150280/1800	18.00	15/2/80	M. Mouse	2/1/80
LP1654/150280/1300	13.00	15/2/80	M. Thatcher	5/1/80
PP9909/180280/1400	14.00	18/2/80	J. Joyce	4/1/80

Figure 3. Second normal form.

DOCTOR

Doctor No	Doctor Name
18654	Dr J. Smith
13855	Dr J. Hyde
18592	Dr L. Baker

PATIENT

Patient Name	Date of Admission
M. Mouse	2/1/80
A. Morrow	11/1/80
J. Durrant	25/12/79
M. Thatcher	5/1/80
J. Joyce	4/1/80

DOCTOR OPERATION

Doctor No	Operation No
18654	AA1234/040280/0830
[illegible]	[illegible]

OPERATION

Operation No	Operation Time	Operation Date	Patient Name

Figure 4. Third normal form.

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PEOPLE

Storage names management team

FOLLOWING its absorption of line printer manufacturer Documation, Storage Technology has named a management team. Managing director is Colin Cook who has been with Storage for two years and previously spent five years with Memorex. The former managing director of Documation, Rod Sear, is now with Newbury Laboratories.

UK sales manager is Terry Rollo. Before joining the company he was in the RAF and then held sales appointments with IBM and Documation. Norman Howarth joined Storage in 1978 from BASF. He helped to set up the Swiss subsidiary and then headed the European technical support group before joining the UK company in April last year. He is now UK field engineering manager.

Manager of systems engineering services is Clive James. He joined Storage two years ago from Calor, and spent six years with Centre-file. Martin Rai, a chartered accountant previously with Documation, joins the company as financial controller.

Marketing manager is another ex-Documation man, Joseph Osbaldeston. He spent most of his time at Documation in European training, going on to become field engineering manager and eventually transferring to marketing.

Ged Toes is UK field operations manager. He spent 12 years with Univac before joining Documation.

TEXAS Instruments annually awards a Distributor of the Year Trophy to the components distributor which shows most enterprise in turnover growth in TI products, product range, stock held and marketing co-operation with TI. This year the award went to ITT, whose general manager Brian Murdoch (right) is pictured receiving the trophy from Rod Attwool, marketing director of Texas Instruments. ITT last year had a franchise growth of over 30%, and this year expects to become a £3 million distributor for TI alone.

- **Paul Carter** and **Bob Jones** have been appointed directors at General Datacomm. Carter joins from Racal as sales and marketing director and Jones, who was previously with Borer Electronics, joins as technical director.
- **Ken Ramsey**, previously system development manager with Tymshare, has moved to CTL as applications product marketing manager for the business computer division.
- **Chris Childs** and **David Greenfield** have joined Hi-Tek as managers. Childs was previously sales and marketing manager at Electrical Remote Control Co (Elremco) and Greenfield was sales and marketing director with Elfton.
- **Alan Fowler** has joined Redifon Computers as product assurance manager. He joins the company from Marconi Space and Defence Systems, where he was principal quality assurance engineer. Also joining Redfion is **Shaun Eden**, who becomes territory manager for the Northern branch. He was previously sales executive with Sperry-Univac.
- **Nigel Payne** has been appointed managing director of CIS (Products), part of the CIS International Group. He was formerly graphic systems manager of the information display division and product marketing manager for terminals and displays, with Tektronix UK.
- **Robert Davies** has become international product manager, human resources systems, with MSA International in Maidenhead. He has been with the company since 1974, but most recently served as human resource product support manager with MSA in Atlanta, Georgia.
- **Bruce Russell**, former lecturer at University College, Dublin, has been appointed head of TSI's Irish software factory, which is expected to open in the summer.
- **Moon Dutt** has joined Redifon Computers as financial manager of international marketing. He was previously at the London Business School, and before that spent a year with the Bank of America as a departmental manager.

COMPUTASTARS

Entries shower in

"THIS is one problem that I welcome." In these delighted words, Computastars and Computatug organiser Gordon Cairns, described his initial reaction to the last-minute rush of entries which poured avalanche-style into his office last week.

"There are between 120-130 teams entered for Computastars and 10 entrants for our fledgling Computatug event," an overworked but obviously exultant Cairns explained earlier this week.

"Commodore will supply hardware and BSO will provide software for the heats, UK final at Birmingham on July 26 and the European final which will be held either at Nijmegen or Utrecht in Holland," Cairns added.

"With word processors and a whole range of Commodore equipment to hand, organising the event and collating results will be a relatively straightforward matter compared to previous years.

"This is the first time we have had computer systems available; other companies have shown interest in the past but BSO Automation Technology and Commodore have converted theoretical sympathy into hard fact."

The final three days of last week brought 60 Computastars entries into Cairns' South London office, and the London area response was so great that he is seeking a second Southern heat venue.

The present tally of entries stands a full 25 per cent greater than last year, but Cairns feels there are still teams or individuals who would like to compete but have not got around to the necessary paperwork.

"I can assure any aspiring competitors that all they have to do is contact me promptly at 117b High Street, Croydon CR0 1QG (tel: 01-688 6690) and their inquiries will be dealt with very sympathetically."

DIARY

MARCH 9
Talisman — the management of success. BCS Bedford branch. Swan Hotel, Bedford. 7.30.
Ada — a new language. BCS Cheltenham and Glos branch. Queens Hotel, Cheltenham. 7.30.
Bringing hardware and software together in microprocessor systems. IEE. Savoy Place, London.
Data communications and networks — the future. BCS Reading branch. Small Physics Lecture Theatre, JJ Thompson Building, The University, Whiteknights.
Privacy legislation. BCS West Herts branch. Culpin Room, The Pavilion, Hemel Hempstead. Details from Gary Freeman on (0234) 65121 ext 218. 7.45.

MARCH 9-13
Medical Informatics Europe (MIE81). BCS. Toulouse, France. Details from Barry Barber, 01-637 0471.

MARCH 10
DP applications in microcomputers. BCS Aberdeen branch. College of Commerce, Holburn Street, Aberdeen. 7.00.
Computers and navigation. BCS Croydon branch. Maple Room, Fairfield Halls, Croydon. 7.15.
ICL — latest announcements. BCS Harlow branch. The Saxon Inn, Southern Way, Harlow. 7.30.

MARCH 17
Software houses debate: Do You Get What You Pay For? IDPM W London-Oxford branch. Bull Hotel, Gerrards Cross, Bucks. 7.30.
Information Engineering. BCS Merseyside branch. Faculty of Science Lecture Theatre, Liverpool University. 6.00.

MARCH 18
Why the DPM needs standards and how. IDPM Central London branch. Pearl and Dean Studio, 15 Broadwick Street, London W1. 6.00.

CONFERENCES

- Understanding and Using Computer Graphics is a conference to be held at the Cumberland Hotel, London from March 11-13. The conference is updated each year to cover the latest practices and problems. The conference aims to give practical information about software, systems and applications. Commercial applications are stressed, discussion is encouraged and two open workshops are included. It is organised by Frost and Sullivan, and the fee is £320. Further information from Chloe Haslam on 01-486 8377.
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A DIRECTOR has been appointed at ICL, to take responsibility for engineering and software research, design and development in the company's Product Development Group. He is Alan Bagshaw, a founder managing director of International Computing Services Ltd.

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DATA ANALYSIS

Normalisation, or the relational approach

Section I – Part 20

of our series describing a system design methodology

by Rosemary Rock-Evans

THIS article will be dealing with the technique of normalisation. Normalisation is also known by the name of the relational approach, and originated from the work of E. F. Codd of IBM's research laboratory in San Jose.

The objective of normalisation is to obtain the highest level of data independence possible, or to put it another way: to ensure that any one entity has only one value for an associated attribute type and to ensure that each associated attribute type is describing the entity type in question, and not another, i.e. that it is not the identifier or the property of another entity type.

These two objectives should be familiar, as they are the same rules used in entity analysis.

The purpose of normalisation is to ensure that the work of updating, creating, retrieving and deleting attribute values is kept to a minimum, whether the effort is that of the computer or the user. It should also ensure that data is not lost because of artificial dependencies introduced into it, i.e. the resulting structures should be robust and consistent.

The building block of the relational approach is a *relation* (not to be confused with a relationship).

A relation is represented by a rectangular table of data values. Each column represents all the different values of an attribute type in the relation, each row all the values of the attribute types which are in some way related, for example, by belonging to the same entity type. However, at this stage the relationship is not known.

The rows and columns are given special names in the relational approach. A row is termed a *tuple* and in our example the row would be termed an 8–*tuple* because there are 8 columns. The columns are called *domains*, thus all the values under the Operation Time column form the domain of the attribute type "Operation Time." (These terms make no difference to the way in which normalisation is achieved, but it is useful to know their meaning since they are used by the proponents of relational databases.)

In Figure 1 an example of a relation is shown. We have used a report which was being produced for the hospital administrators. It was called the Doctors' Operating Schedule, and showed which doctors were scheduled to be present and/or perform at operations. It is unnormalised, because it cannot be represented by a pure and consistent data structure.

Certain rules governing the relation must have been followed before normalisation can proceed.

- Each attribute type must only occur once in the relation as a column heading.
- Each value of an attribute type must be consistent in its format and the attribute type name must be such that it does describe the value.

For example, it would be wrong to have operation date values of 02/80 and 03/02/80 under the same column heading and also wrong to have just "Date" as a column heading describing both dates of admission and dates of operations.

These points are usually taken care of by the fact that the forms, reports, etc, are usually structured in this way already.

The steps to normalisation are as follows: first, an identifier of the tuples must be found. Each attribute value (or group of attribute values) is examined to see if it (or they) identifies a tuple, and once the value (or values) is identified, the corresponding attribute type (or types) is underlined in the table. In our example, doctor number and operation number uniquely identify each tuple in our relation.

Next, remove repeating groups – the doctor number and doctor name are repeated within the relation (the report may in fact have omitted them, but the implication that they would have been repeated is still there).

The original relation is split into two, so that the repeating group only occurs once, and a new key is chosen to identify each tuple in the new relations.

In Figure 2 a relation with doctor number as a key has been created and a relation with a key of doctor number and operation number. The data is now said to be in *first normal form*.

Third, ensure that the values of the attribute types are fully dependent on all the key attribute type values. Several questions can be asked to determine this:

(a) If the complete key is changed, i.e. amended or deleted, etc, which attribute types are affected?

(b) If I change only part of the key i.e. each attribute type value making up the key, which attribute type values are affected?

The values in the Figure are intended to be used in deciding these points.

For example, if I change or delete Operation Number BA1598/040280/1030 it looks from the values as though I would have to change the operation time and date, the patient name and the date of admission. All information on Operation LP1654/150280/1300 is erroneously lost if I delete doctor 13855.

The relations are again split so that all the attributes are dependent on the key items. The result is as shown in Figure 3, which is said to be in *second normal form*. Note we have found no attribute types dependent on the full doctor number/operation number key. The resultant Operation relation contains no duplicated operation numbers, in other words duplicated rows are removed as part of the process of normalising to 2NF.

Finally, remove all attribute type values "transitively" dependent on other attribute type values. Again, the data values are intended to show where "transitive dependence" occurs. From Figure 3 it appears that the date of admission is dependent on the patient name because repeating groups of values occur. The attribute types which are related are removed from the relation and one chosen to identify the resulting tuples.

In Figure 4 the resulting relations are shown. Patient name has been chosen to identify the tuples which have resulted.

The relations are now said to be in *third normal form*.

Fourth and fifth normal forms have been invented by people other than E. F. Codd, but these two forms place a very high reliance on an interpretation of the patterns of the data values. This may be sheer coincidence, and it is for this reason that they have not been discussed in this article.

It is possible to convert the relations into an entity model using the following steps (see Figure 5): place the relations with the fewest keys at the top of the page; where a key occurs at two levels replace the lower level key by an empty box and a line representing a 1:N relationship; where an attribute type occurs in one relation as a key and in another as a non-key replace it by a 1:N relationship.

Thus relations can be converted to a model, and similarly the model can be converted back to relations (this will have some bearing if implementation is being planned using a relational database).

This article has concentrated on normalisation as a technique which can be used to verify entity analysis. CACI does not use normalisation in isolation to produce entity models and determine attribute types. In the company's methodology it is used to reveal any erroneous relationships between attributes of an entity type that have been missed, determine which attribute types could be used as keys (if these are not known) and check and verify that the model includes all entity types and all necessary relationship types.

Since it is a widely used technique, it is important to understand the limitations of the approach. The disadvantages of normalisation are as follows:

a) It is impossible to identify an entity type from a relation unless a possible identifier is present, or only one attribute type of the entity type (its key, say) is present.

b) A basic understanding of the attribute types must have been gained before normalisation can take place. Although normalisation is supposed to rely on data values, it is dangerous to assume that information can be deduced using the data values alone without any knowledge of the entity types or attribute types. If normalisation is used with no knowledge of the business, sheer coincidence can result in completely erroneous results.

c) The types of information generally used for normalisation e.g. reports, forms, existing computer record contents, can give misleading information about the entity types and relationship types in a business. A report is, after all, a combination of data extracted from knowledge of entity types and relationship types. The extraction process need not necessarily maintain the original structure.

For example, normalisation of a report showing the patients due to attend a clinic session would result in a relationship type between a patient and clinic session. We know from the model that this is redundant and is derived by knowing the appointments the patient has. In other words, the relational approach can introduce redundancy.

d) However much normalisation an analyst does, there are some relationships and entity types which never appear. This is because the reports and forms, etc, are again the limiting factors.

e) Normalisation can be a [illegible] consuming task. It is better to [illegible] it for verification, rather than [illegible] the main analysis tool, simply [illegible] cause so many redundant relationship types can be [illegible] which then have to be eliminated. In other words, much more [illegible] is required for normalisation [illegible] for entity analysis to give the [illegible] results.

The advantages of normalisation are:

a) It is a mathematical step-by-step approach for people who feel more comfortable using mathematically based methods for analysis (but note the point made above, that reliance can never be placed on normalisation alone).

b) It is useful as a checking and verification tool.

c) It may provide information, say, possible keys which may not be available from any other source.

In Part 21 we will start to look at some of the application design considerations affecting the mechanism for implementation.

The Data Analysis methodology was developed at CACI by [illegible] Palmer.

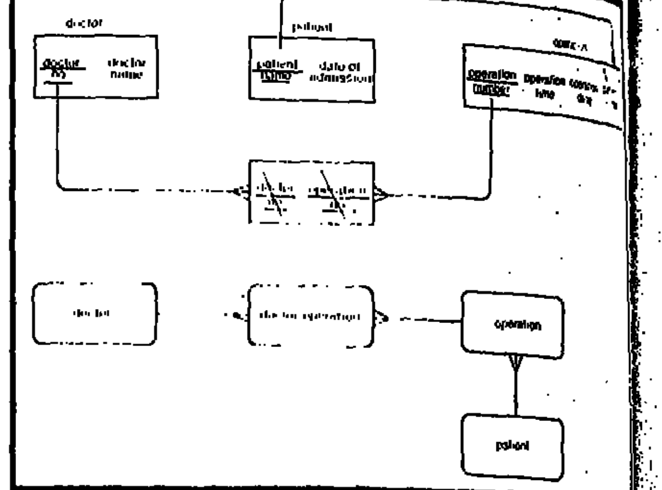

Figure 5. Converting to an entity model.

REPORT NO 24 | BRIGHTHOLMLEE COTTAGE HOSPITAL DOCTOR'S OPERATING SCHEDULE | DATE PRODUCED 22/1/80

Doctor No	Doctor Name	Operation number	Operation Time	Operation Date	Patient Name	Date of Admission
18654	Dr J. Smith	AA1234/040280/0830	08 30	4/2/80	M. Mouse	29/ 1/80
18654	Dr J. Smith	BA1598/040280/1030	10 30	4/2/80	A. Morrow	11/ 1/80
18654	Dr J. Smith	FG1965/040280/1800	18 00	4/2/80	J. Durrant	25/12/79
18654	Dr J. Smith	AA1234/150280/1800	18 00	15/2/80	M. Mouse	2/ 1/80
13855	Dr J. Hyde	LP1654/150280/1300	13 00	15/2/80	M. Thatcher	8/ 1/80
18592	Dr L. Baker	PP8969/180280/1400	14 00	18/2/80	J. Joyce	4/ 1/80
18592	Dr L. Baker	BA1598/040280/1030	10.30	4/2/80	A. Morrow	11/ 1/80
18592	Dr L. Baker	FG1965/040280/1600	18 00	4/2/80	J. Durrant	25/12/79

Figure 1. The unnormalised relation. No 18654 Dr J. Smith, and No 18592 Dr L. Baker occur in repeating groups.

DOCTOR

Doctor No	Doctor Name
18654	Dr J. Smith
13855	Dr J. Hyde
18592	Dr L. Baker

DOCTOR OPERATION

Doctor No	Operation Number	Operation Time	Operation Date	Patient Name	Date of Admission
18654	AA1234/040280/0830	[illegible]	[illegible]	M. Mouse	[illegible]
18654	BA1598/040280/1030	[illegible]	[illegible]	A. Morrow	[illegible]
18654	FG1965/040280/1800	[illegible]	[illegible]	J. Durrant	[illegible]
18654	AA1234/150280/1800	[illegible]	[illegible]	M. Mouse	[illegible]
13855	LP1654/150280/1300	[illegible]	[illegible]	M. Thatcher	[illegible]
18592	PP8969/180280/1400	[illegible]	[illegible]	J. Joyce	[illegible]
18592	BA1598/040280/1030	[illegible]	[illegible]	A. Morrow	[illegible]
18592	FG1965/040280/1600	[illegible]	[illegible]	J. Durrant	[illegible]

Figure 2. First normal form.

DOCTOR

Doctor No	Doctor Name
18654	Dr J. Smith
18592	Dr L. Baker
13855	Dr J. Hyde

DOCTOR OPERATION

Doctor No	Operation No
18654	AA1234/040280/0830
18654	BA1598/040280/1030
18654	FG1965/040280/1800
18654	AA1234/150280/1800
13855	LP1654/150280/1300
18592	PP8969/180280/1400
18592	BA1598/040280/1030
18592	FG1965/040280/1600

OPERATION

Operation No	Operation Time	Operation Date	Patient Name	Date of Admission
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Figure 3. Second normal form.

DOCTOR

Doctor No	Doctor Name
18654	Dr J. Smith
13855	Dr J. Hyde
18592	Dr L. Baker

PATIENT

Patient Name	Date of Admission
M. Mouse	[illegible]
A. Morrow	[illegible]
J. Durrant	[illegible]
M. Thatcher	[illegible]
J. Joyce	[illegible]

DOCTOR OPERATION

Doctor No	Operation No
[illegible]	[illegible]

OPERATION

Operation No	Operation Time	Operation Date	Patient Name
[illegible]	[illegible]	[illegible]	[illegible]

Figure 4. Third normal form.

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PEOPLE

Storage names management team

FOLLOWING its absorption of line printer manufacturer Documation, Storage Technology has named a management team. Managing director is **Colin Cook** who has been with Storage for two years and previously spent five years with Memorex. The former managing director of Documation, **Rod Sear**, is now with Newbury Laboratories.

UK sales manager is **Terry Rollo**. Before joining the company he was in the RAF and then held sales appointments with IBM and Documation. **Norman Howarth** joined Storage in 1978 from BASF. He helped to set up the Swiss subsidiary and then headed the European technical support group before joining the UK company in April last year. He is now UK field engineering manager.

Manager of systems engineering services is **Clive James**. He joined Storage two years ago from Calor, and spent six years with Centrefile. **Martin Rai**, a chartered accountant previously with Documation, joins the company as financial controller.

Marketing manager is another ex-Documation man, **Joseph Osbaldeston**. He spent most of his time at Documation in European training, going on to become field engineering manager and eventually transferring to marketing.

Ged Toes is UK field operations manager. He spent 12 years with Univac before joining Documation.

TEXAS Instruments annually awards a Distributor of the Year Trophy to the components distributor which shows most enterprise in turnover growth in TI products, product range, stock held and marketing co-operation with TI. This year the award went to ITT, whose general manager Brian Murdoch (right) is pictured receiving the trophy from Rod Attwool, marketing director of Texas Instruments. ITT last year had a franchise growth of over 30%, and this year expects to become a £3 million distributor for TI alone.

- **Paul Carter** and **Bob Jones** have been appointed directors at General Datacomm. Carter joins from Racal as sales and marketing director and Jones, who was previously with Borer Electronics, joins as technical director.
- **Ken Ramsey**, previously system development manager with Tymshare, has moved to CTL as applications product marketing manager for the business computer division.
- **Chris Childs** and **David Greenfield** have joined Hi-Tek as managers. Childs was previously sales and marketing manager at Electrical Remote Control Co (Elremco) and Greenfield was sales and marketing director with Elfton.
- **Alan Fowler** has joined Redifon Computers as product assurance manager. He joins the company from Marconi Space and Defence Systems, where he was principal quality assurance engineer. Also joining Redfion is **Shaun Eden**, who becomes territory manager for the Northern branch. He was previously sales executive with Sperry-Univac.
- **Nigel Payne** has been appointed managing director of CIS (Products), part of the CIS International Group. He was formerly graphic systems manager of the information display division and product marketing manager for terminals and displays, with Tektronix UK.
- **Robert Davies** has become international product manager, human resources systems, with MSA International in Maidenhead. He has been with the company since 1974, but most recently served as human resource product support manager with MSA in Atlanta, Georgia.
- **Bruce Russell**, former lecturer at University College, Dublin, has been appointed head of TSI's Irish software factory, which is expected to open in the summer.
- **Moon Dutt** has joined Redifon Computers as financial manager of international marketing. He was previously at the London Business School, and before that spent a year with the Bank of America as a departmental manager.

COMPUTASTARS

Entries shower in

"THIS is one problem that I welcome." In these delighted words, Computastars and Computatug organiser Gordon Cairns, described his initial reaction to the last-minute rush of entries which poured avalanche-style into his office last week.

"There are between 120-130 teams entered for Computastars and 10 entrants for our fledgling Computatug event," an overworked but obviously exultant Cairns explained earlier this week.

"Commodore will supply hardware and BSO will provide software for the heats, UK final at Birmingham on July 26 and the European final which will be held either at Nijmegen or Utrecht in Holland," Cairns added.

"With word processors and a whole range of Commodore equipment to hand, organising the event and collating results will be a relatively straightforward matter compared to previous years.

"This is the first time we have had computer systems available; other companies have shown interest in the past but BSO Automation Technology and Commodore have converted theoretical sympathy into hard fact."

The final three days of last week brought 60 Computastars entries into Cairns' South London office, and the London area response was so great that he is seeking a second Southern heat venue.

The present tally of entries stands a full 25 per cent greater than last year, but Cairns feels there are still teams or individuals who would like to compete but have not got around to the necessary paperwork.

"I can assure any aspiring competitors that all they have to do is contact me promptly at 117b High Street, Croydon CR0 1QG (tel: 01-688 6690) and their inquiries will be dealt with very sympathetically."

DIARY

MARCH 9

Talisman – the management of success. BCS Bedford branch. Swan Hotel, Bedford. 7.30.

Ada – a new language. BCS Cheltenham and Glos branch. Queens Hotel, Cheltenham. 7.30.

Bringing hardware and software together in microprocessor systems. IEE. Savoy Place, London.

MARCH 9-13

Medical Informatics Europe (MIE81). BCS. Toulouse, France. Details from Barry Barber, 01-637 0471.

MARCH 10

DP applications in microcomputers. BCS Aberdeen branch. College of Commerce, Holburn Street, Aberdeen. 7.00.

Computers and navigation. BCS Croydon branch. Maple Room, Fairfield Halls, Croydon. 7.15.

ICL – latest announcements. BCS Harlow branch. The Saxon Inn, Southern Way, Harlow. 7.30.

Data communications and networks – the future. BCS Reading branch. Small Physics Lecture Theatre, JJ Thompson Building, The University, Whiteknights.

Privacy legislation. BCS West Herts branch. Culpin Room, The Pavilion, Hemel Hempstead. Details from Gary Freeman on (0234) 65121 ext 218. 7.45.

MARCH 17

Software houses debate: Do You Get What You Pay For? IDPM W London-Oxford branch. Bull Hotel, Gerrards Cross, Bucks. 7.30.

Information Engineering. BCS Merseyside branch. Faculty of Science Lecture Theatre, Liverpool University. 6.00.

MARCH 18

Why the DPM needs standards and how. IDPM Central London branch. Pearl and Dean Studio, 15 Broadwick Street, London W1. 6.00.

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The intelligence gathering system used by the Thames Valley Police is unlike any other. Exclusive report by Paul Fisher

Controversial system is 'helping the police with their inquiries'

SINCE 1976 the Thames Valley Police, TVP, has been operating an intelligence-collating computer network based at its headquarters in Kidlington. Dubbed the Collator Project, it is the only system of its kind in the county and, from its inception, has been controversial.

The controversy has focused on the kind of information being gathered and the uses to which it is put.

A national plan to extend similar systems, containing intelligence as well as matters of record, was dropped at the beginning of 1979. Ken Oxford, chief constable of Merseyside, said at the time that the TVP system had "inherent dangers".

When approached by Computer Weekly, the TVP was swift to grant an interview. At the conclusion of the first interview, the TVP insisted on a list of questions. These were answered by a written statement which is quoted here in full (in italics).

The statement was made, with Home Office vetting, by the TVP's assistant chief constable of management services, Joe Emery, and was followed by a further interview and a visit to the computer room.

The statement has seven headings: History of the Project, Purpose of the Experiment, Progress, Funding, Future, Information on the Computer, and Safeguards.

History of the project

1. The need to store information coming into the possession of police has developed since the formation of the modern Police Service during the last century. This information, which has become known as crime intelligence, has two major objectives:

(a) The protection of the public by means of the prevention of criminality, and

(b) the detection of offenders against the peace.

2. The advent of unit beat policing, which was intended to help police operate on a neighbourhood basis, together with improved personal communications, led to more information being stored in police stations. Such information was filed and recorded manually on cards and was difficult to link together. Manual systems of storage are difficult to cross-reference which in time makes the information difficult to retrieve and therefore largely inaccessible to many operational police officers.

3. An initial, but limited, experiment in computerising collator's records was carried out in one police station in the Thames Valley and this led to an extended experiment throughout the Force, and the development of the system as it is today.

Emery is anxious to place the Collator Project in an historical perspective. He believes that changes in police methods are reflections of changes which have taken place in society at large and he stresses that increased mobility, both of the general population and among police officers, has inevitably produced a less intimate form of policing than existed in the past.

As in the rest of the country, he reckons that one third of the Thames Valley's 1.8 million population moves house once every five years. Police officers, too, now move from one part of the country to another. (There is a Scottish PC computer operator at Kidlington.)

From the police point of view, a major result of the motorway system is that criminals are more mobile and therefore harder to trace.

The police now deal with a greater bulk of information from more diffuse sources. Information and intelligence which was previously stored in policemen's heads is now, of necessity say senior officers, filed. "The TVP," says Emery, "is doing electronically what has been done for the past 150 years."

In 1966 one of the effects of unit beat policing was the establishment of a formal record-keeping system. It involved the appointment of a local intelligence officer, LIO, with a brief to build up files of names, addresses, criminal records, incidents and vehicles.

> **'Police intelligence is now forward looking . . . and because it is so powerful, it is frequently libellous.'**

Elsewhere in the UK's 51 other police forces, the LIOs create manual filing systems. In May 1972, before the TVP's computer had been introduced although it had been mooted, the Police Review carried a report which voiced certain reservations:

"Since 1966 the Service has collators in most Police divisions and they have amassed information which in both quantity and quality would surprise most people on their books.

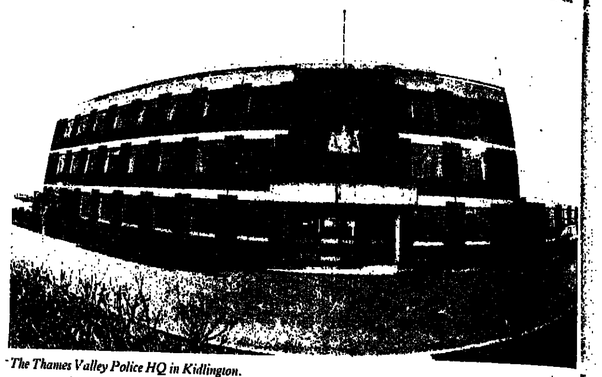
"Police intelligence is now forward looking, anticipating who is going to commit what, when, and where and because it is so powerful it is frequently libellous. Much of the information stored in collators' files is tinged with the calculated guesswork of the officer who has provided it. Much of the information is personal detail and it may seem a trespass on the freedom of the individual.

"There is a serious danger that once a person is in the system he may remain there."

However, the principle of intelligence gathering is as old as the principle of policing itself. It is the method of storage and retrieval which is contentious.

More contentious still is the use of a computer for the "prevention of criminality" and it is in this area that the police are attracting fierce criticism. Intelligence which can be used to prevent crime is also a potential threat to individual privacy.

Journalist Duncan Campbell, campaigner against threats to individual rights, writing in Volume 2 of the book Policing the Police, contends that the preventive style of policing represents a sinister shift. "The emphasis," writes Campbell, "in investigation has changed from evidence gathering after the commission of crime to intelligence gathering in advance of any particular crime being committed."



The Thames Valley Police HQ in Kidlington.

Emery would certainly not concede that intelligence gathering is sinister. Rather, he would see it as part of a policeman's duty. "We are paid," he says, "to prevent crime and catch criminals."

At present it is entirely a matter for the police to identify potential criminals without any statutory or other external guidelines. Every individual has the potential to be a criminal, so the issue devolves into who has what details stored on them within the computer. Those questions were not fully answered when put by Computer Weekly.

Campbell says: "The present drift to speculative intelligence gathering, in which any citizen, however innocent, is regarded as fit subject for surveillance because of what he may do in the future, must be stopped."

Emery likes to talk of practicalities and by way of an example he pointed out of his office window and said: "If we were told that the British Legion was likely to be broken into tonight and this is the kind of information we do get, you'd expect us to do something, wouldn't you?"

Purpose of the experiment

4. The current project is an experiment being conducted jointly by the Home Office and the Thames Valley Police. The objectives are to see if:

(a) it is practicable and efficient to put on to a computer information collected by police collators, and

(b) judgments can be made of the relative value of differing types of criminal information collected.

The police very quickly made plain their relationship to the Home Office: "It's not our experiment, it's a joint experiment with the Home Office. Our agreement is that the TVP does not release anything without their approval."

Therefore Computer Weekly agreed to submit its list of questions, to return later for the joint statement and to conclude the interview.

The hardware and network serve over 3,000 policemen who cover the 2,200 square miles of Oxfordshire, Berkshire and Buckinghamshire. Of the 32 terminals, nine are at Kidlington for development and training and the others are distributed in 19 police stations throughout the area.

The Honeywell kit was purchased by the Home Office for £500,000 and installed in September 1975. There have been two upgrades from the original 6025 processor to the current 192K 6060. The system is linked into the main power supply and has a pair of Datanet 305 front end processors. There are five 100-megabyte hard disc drives, one of which is removable. These are journalised on to tape every 24 hours.

The policemen I spoke to seem happy with the system. Superintendent George Hedges, who has overall responsibility for day-to-day running, was unwilling and, he says, "technically unable" to elaborate on faults, but he did concede that "communications need rationalising".

Although still officially considered an experiment, the project is live and it is relied upon to a considerable degree. A measure of the system's value to the TVP is in the number of occasions it is accessed. In an average week there are 300 indirect retrievals, 3,000 direct retrievals and 8,000 card access from a police force numbering 3,000.

An indirect retrieval is made on the basis of very limited information, such as the first three letters of a car number-plate. With direct access there are fuller details to assist the search while the card accesses rely on backup cards which are produced by the computer and stored in a room next door.

Emery appears in little doubt as to the experiment's value. He is unable to say whether a higher number of crooks had been caught but did say: "It has been a very useful tool."

He went on to say: "It has enormous potential although it is too early to be specific. We use it to correlate and assess criminal intelligence. I'm a user, not a technician, and it is hard to evaluate results, but the task it does would be impossible to do manually. Until you have a computer, information tends to stand in isolation."

Progress

5. The first objective (practicable) has been achieved, in that information is being input and retrieved only by authorised officers. Those officers authorised to create and delete records are few, and their work is carefully monitored at Force Headquarters. Information can only be retrieved by password holders who are limited in number and can afterwards be identified. The second objective (assessment of value), although on-going, is being achieved and the first report evaluating this material is expected in the near future.

The project has largely freed itself of outside technical support. The resident manager from the Home Office's Scientific Development Branch left the site in 1979. Hedges, who can in practice be regarded as DPM although he does not regard himself as such, has been with the project for two years. Apart from a recently appointed Cobol programmer and the visiting Honeywell engineer, all key staff are from TVP ranks.

"If we aggregated to computer professionals," says Hedges, "we wouldn't be in our interests. The project needs a police view and police thought, and if it didn't have there would be a danger of losing integrity within the force."

The policemen volunteered for their DP roles and none came with any DP experience. Nonetheless, Hedges is concerned that individual officers could become "technically too important", adding that the nature of modern policing demands that "all policemen do some sort of specialised work". He is fulsome in his praise for the five police constable operators who between them provide round-the-clock coverage. "They are more important than I am," he says.

The man near the computer with a pivotal role is Inspector Brian Squelch. He is in charge of operations manager and takes charge of training and the preparation of instructional and guidance bulletins.

His job, as the general LIO, is to monitor what the other 19 officers put into the system. Of the 19 LIOs in the outlying police stations, one is a sergeant and the remaining 25 are constables. Along with some 30 officers in specialist units, they are the only people with the authority to create, update and delete information. Indication of such authority is contained within the password these officers are issued.

There are a further 350 lower level password holders who are able to access the system from the terminals but not to create, update or delete.

The passwords are known only to Squelch and to the holder and when typed into the terminal do not appear on the screen. The maximum length of the passwords is 15 letters, which is an increase to thwart those who would peer over the holder's shoulder as he keys his secret word to the screen.

Passwords can be used to determine security levels, although this facility has been left untapped. As an additional security measure, the first message to appear on the screen is the last time that the password was used.

Much store is set by the passwords, as can also be seen at the conclusion of the TVP's statement.

Funding

6. The experiment has been funded by the Home Office in relation to the purchase and maintenance of the computer, and the provision of technical staff, and by the Thames Valley Police Authority in the provision of a computer hall and operating staff. Further funding will depend on the decision concerning the future of the system.

So far, the Home Office has footed the major part of the bill. A sum of £700,000 has been requested by the TVP from central police funds. This is for computing in general, and apart from the Collator Project includes proposed expenditure on: fleet management, personnel records, stores, firearms and shotguns, police housing records, uniform issue, criminal records, crime reports, wireless equipment and resource deployment.

An additional £70,000 has been put aside to cover maintenance costs should the system be allowed to continue when the Home Office pulls out next October. By then, two reports — an internal one being prepared by Hedges and an external one detailed below — will have determined the future of the project.

Future

7. A report on the evaluation of the experiment is being prepared jointly by the Home Office and Thames Valley Police. It will be in the light of this evaluation that the final decision concerning the future of the project will be made. That decision will be made by a policy committee comprising members of the Police Authority, the Thames Valley Police and the Home Office. That committee will also consider the report of a study team which, over the last two years, has been considering the future computer needs of the Force in many other administrative and operational fields.

The appointment of the civilian programmer would suggest that the project has a future. If it is retained, Hedges reckons that the Honeywell kit "should be in use for the next two or three years". The police authority chairman, Ron Clibbon, said last November when the external committee was set up: "I think it is sensible to appoint the working party and let them see what should be done."

Both the committee's and Hedges' reports will be presented in May.

It would seem that Emery is willing to publicise the project, as he has recently responded to a request by the Sunday Times by inviting them to Kidlington. Perhaps it is in anticipation of the reports. He commended a Sunday Times Insight report from July 2, 1978, as being a fair piece of reporting.

Information on the computer

8. The information going on to the computer is no different to that which has been kept in paper records in Police Forces for many years. Naturally, putting such information on to a computer raises more far-reaching issues, which were carefully considered when the experiment was planned. They will again be considered in the light of the report of the Data Protection Committee, and any legislation that may ensue. The project should help the consideration of the recommendations affecting police dedicated computers because it will provide a more precise analysis of the type of information collected through the collating system and its operational value.

> **'If we aggregated to computer professionals it wouldn't be in our interests. The project needs a police view and police thought, and if it didn't have, there would be a danger of losing integrity within the Force.'**

This section of the statement is the closest response to my written question submitted after the preliminary interview: "How many people have details about them recorded on the system and what percentage of those are convicted criminals?" In any statistical sense the question remains unanswered.

"The majority of the information," says Emery, "is on criminals. You have to trust us."

"I wish we could be more open," says Hedges. "If people are honest, they won't find their way on to the system. First timers aren't going to be on there."

"To my mind," says Squelch, "all the information in there is factual. We don't encourage the input of information for the sake of information. We are simply providing a service for the lads." Squelch has prepared the guidelines for evaluating the input, although these remain confidential.

Other than disqualifications, traffic offences are unrecorded. Traffic accidents are also unrecorded unless they involve a criminal or a stolen vehicle. The police say that if five youths were stopped in a car and four of them had no criminal record, the one who did have a record would be the only one to have details of the event recorded.

Two groups of people who are on the system but who are not criminals are "the aggrieved in crime" (that is victims of crime) and missing persons. Hedges denies that the victims are there as a result of a desire to record intelligence willy nilly, and stated that the purpose was to cope with stolen property. Last year 3,000 people were reported missing in the TVP area.

A demonstration search was conducted by Inspector Squelch. Details of an imaginary suspect had been fed into the system so that this demonstration could be given without violating privacy. The imagined suspect was identified as having a tattoo on his right arm, brown hair, a red or red and white car and being aged between 31 and 36. An indirect retrieval.

The password was keyed in, although it could not be seen on the screen. It was followed by the details. One of the operators thought that a comparable force-wide search relying on card indexes would take a month.

First to appear on the screen was an indication of response time. The indicators go from A to E, A for a maximum two-minute data recovery time and E for several hours. The demonstration was on a five database on a Friday afternoon and a B level response was indicated. This search resulted in one hit and details of the individual eventually came back after five minutes. Had it been remembered that the imaginary suspect was a gipsy, the response would have been much swifter.

Each of the five police operators is responsible for one of five files for names, vehicles, addresses, occurrences and crime records. After three and a half years the files have reached approximately 50% of their capacity, although the police are aware it is not practicable to fill them completely.

The operators spend as little as a quarter of their shifts actually operating, and give the rest of their time to calling back records, making improvements and generally checking the quality of the LIOs' work. They therefore like to be thought of as database administrators.

The only published figures about what is on the files is in Duncan Campbell's account in Policing the Police. Dating back to 1979, they were supplied by the Home Office.

persons: 99,825
vehicles: 17,156
addresses: 77,834
occurrences: 66,998
crimes: 5,943

Hedges did not want to comment directly on the figures but thought that they were misleading. He estimated some 30% of the people in the system live outside the Thames Valley area.

Squelch also said that many criminals operate under several aliases, which creates distortions. He knows of one criminal with 15 aliases.

The vehicle file is small because it is restricted to suspected users and the Police National Computer, PNC, in Hendon is accessed for other vehicle details. The PNC is updated daily from the Driver Vehicle Licensing Centre in Swansea.

> **'The information going on to the computer is no different to that which has been kept in paper records in Police Forces for many years. Naturally, putting such information on to a computer raises more far-reaching issues.'**

The Data Protection Committee referred to in the statement was between 1976 and 1978 under the chairmanship of Sir Norman Lindop. Unlike the earlier Younger report, it did not exempt the police from its scrutiny. It envisaged, among other things, the establishment of a data protection authority to lay down guidelines for the acquisition, storage and collation of police information and intelligence. Hedges is quite unequivocal about welcoming the possibility of data legislation, saying: "The quicker it comes, the better."

From the beginning to the end of the two visits to Kidlington, policemen returned time and again to the theme of their accountability to the courts, to the police authority and to the public at large. They accept that any data legislation should clearly establish accountability and mark the boundaries within which schemes such as the Collator Project should operate. Until this is enshrined in law, everyone concerned pushes ahead in a vacuum.

Safeguards

9. The most stringent precautions are taken by the Thames Valley Police Force to safeguard the information in the computer. Firstly, the equipment is housed entirely on police premises. Secondly, it is not linked with any other system. Thirdly, the information held is meant to be relevant to the prevention and detection of crime and not to be concerned with matter that is unrelated or lacking in substance. Fourthly, data can be obtained only by officers who are personally authorised to have access to the computer system; a system of passwords controls access to the computer and, as a further precaution, the data can be structured into different levels of security, with passwords being graded according to the level of security to which holders are permitted to have access. Fifthly, this security system makes the information stored much more secure than similar information held on manual systems and computerisation does enable records to be controlled, evaluated and weeded much more effectively.

The final section returns to the theme of security. Apart from the passwords and the limited terminal access within the force, security is provided at a number of other levels. There is a "reluctance para" information over the air", a tacit admission that on occasion information is passed over the air. Herein lies a potential breach of security.

There is a private wire network which Hedges said even individuals from British Telecom or Honeywell would find extremely difficult to cross. It is a transaction driven system and terminal operators must know their codes, and there is a rule that they must not leave their seats while accessing data.

On the site an elaborate procedure of security cards at two doors should ensure that no stranger stumbles in unaware of where he is. The computer room has no windows and is scanned by closed circuit TV. The console area outside the main computer room has windows, but these are covered by sturdy grilles at nightfall.

Hedges is clear on the question of linkage to other police computers. "It has never been interfaced with anything else, not even the PNC. It can't happen." He went on to say that the data is not used for any other purpose than that for which it was intended and cited health and financial records as being more comprehensive and potentially dangerous.

"It's absurd to say that you can't keep criminal intelligence," says Hedges. "There is nothing of evidential value in there. It's not a method of policing, it's an assistance."

Throughout the two interviews there was an insistence that there was nothing "sinister" about the project, an insistence which was not entirely upheld by the refusal to answer directly some of the questions on the exact nature of the intelligence which is being stored.

REFERENCE

"Policing the Police Volume 2", edited by Peter Hain. John Calder, 1980.

Assistant Chief Constable Management Services, Q. J. Emery: "Until you have a computer, information tends to stand in isolation."

MICROSYSTEMS 81
EXHIBITION & CONFERENCE
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A complete study of microprocessors in use.
Microsystems 81 consists of a wide ranging exhibition, together with a three day conference and three one-day microprocessor awareness courses. Together they comprise an invaluable opportunity for those interested in microprocessor applications and the latest developments in microelectronics technology. Take advantage of this unique event to examine and discuss a comprehensive range of microprocessors, peripherals, memory products and personal computers together with the software which accompanies them.
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For advance exhibition tickets at £1 each, write to Microsystems Tickets IPC Exhibitions Ltd, Surrey House, 1 Throwley Way, Sutton, Surrey SM1 4QQ
Please note applications for tickets cannot be accepted after February 23, although tickets will be available at the door price £1
Cheques should be made payable in UK sterling to IPC Business Press Limited

Police outline 'stringent precautions' taken to protect their database

Superintendent Hedges: "There is nothing of evidential value in the computer. It's not a method of policing, it's an assistance."

1981 FEATURES PROGRAMME
26 March
– Peripherals
16 April
– Communications
30 April
– Compec Europe Preview/ Competition from Abroad
14 May
– National Computer Conference Report
Contact:
David Hogan on
01-661 3500

A combined word and data processing facility based on an Apple II and electric typewriter/printer from Personal Computers Ltd.

Microsystems 81, the fourth event of its kind, is being held at the Wembley Conference Centre between Wednesday, March 11 and Friday, March 13. Last year's exhibition attracted 5,500 visitors and the organisers are expecting an even bigger turnout this year.

More than 170 delegates are expected for the personal computing conference on the last day. Among the topics will be a discussion on the problems and pitfalls of going it alone when using personal computers for business applications.

The range of fresh ideas presented in our exhibition preview illustrates the fact that the longer we have the micro, the more we can find to do with it. The feature is rounded off with a look at the micro's role in networks.

MICROSYSTEMS'81
Sponsored by Computer Weekly

Low-cost solutions offered to a variety of problems

by Anthea Ballam

IN the midst of the recession, the fourth Microsystems exhibition offers an opportunity for commercial and industrial management to find low-cost solutions to a variety of problems. The choice promises to be wide.

Apart from the familiar proven microsystems products there is an array of new components and peripherals, and a selection of packaged software. The conference provides the theoretical background to this most important area of data processing, while the exhibition offers practical and demonstrable examples of products ranging from the most sophisticated multi-user network to the humblest floppy diskette.

In addition, there will be stands from publishing and book-selling organisations and representations from the Department of Industry, the City of Bradford Metropolitan Council, and Gwent County Council, all eager to establish their interest in future microcomputer technology developments.

The past year has seen some conspicuous trends in microsystems developement. Software possibilities have advanced significantly with the widespread use of popular operating systems like CP/M and packaged products like Visicalc and Desktop Plan. The advent of Winchester disc storage systems has also made these products even more cost justifiable in a commercial and industrial environment.

For the microcomputer enthusiast, systems from Newbear and Sinclair open up the possibilities of experimentation even with minimal resources.

Followers of the latest technological wizardry will be hurrying to the exhibitors that have promised us new products at this year's show. Many of these will be unveiling products for the first time, and some have chosen the exhibition for their worldwide debut — like Portable Microsystems with its Scope office computer.

Claimed to be the first portable office computer, Scope houses processor, storage, video and thermal printer in a single unit. Featuring the new standard CP/M operating system, this product is likely to provoke much interest. Portable Microsystems will also be showing the new AL13 acoustic coupler from Sweden, and the Digicass digital cassette recorder for low-cost file storage.

The sophistication of microsystems development will be underlined by Micro Scope of Maidenhead which will be demonstrating both new systems and applications. Following an agreement with Burr Brown, Micro Scope will show the 10S 2000 and CS 450 process control and monitoring systems.

Micro Scope sells and supports these products and will also be making the most of its other new stars, Micro Vacs and Micro Pars. Micro Vacs is a micro-based accommodation display system that is particularly suitable for use by tourist information centres where its database facility provides an effective filing system on hotels and boarding houses. Micro Pars is a flight inventory and accounting system for travel agents.

Another new arrival to the show will be the latest business system from Solid State Technology, the series 8100. This will be featured on the Hawke Electronics stand. Based on multiple 8085 processors, it is capable of expansion to a maximum file storage capacity of 16 megabytes.

Hawke Electronics will also display the Motorola multi-user, multi-tasking Exormacs 16-bit processor alongside products from Texas Instruments and AMC.

Another "first" has been promised to us by INCAA (Industrial Computerised Applications and Automation). This will be the Incos microcomputer which grew out of INCAA's Camac computer.

The Eurocard based Incos system can be built up to meet users' individual requirements, and the product is made additionally attractive by a choice of interfaces for video terminals and printers, analogue inputs, control circuits for motors and logic controllers.

A return exhibitor, Anadex, has chosen Microsystems 81 for the launch of two printing products. The 132-220 column systems printer will be highlighted, along with a new 80-column printer that reproduces alphanumeric characters as well as high density graphics.

Developed by Advanced Micro Devices, the System 8 Development System has been fitted with the latest RTE16/8050 real time emulator support package. Other exhibits will include the System 29 which comes complete with all hardware, software and applications cards included. This exhibitor will also be showing a cross-section of LSI devices including a new range of 16K PROMs.

The familiar face of the computer equipment supplier Tektronix will be seen at the show. The first of a new modular family of development systems, the 8550 Microcomputer Development Lab will be on display. This incorporates complete in-circuit emulation and hardware testing capabilities. This product is based on two fundamental component units for microprocessor development and data management.

Hewlett-Packard will be spotlighting two instruments for implementing analysis testing a microprocessor based system. Designated the HP 5001 and 5005A, the first of the two allows signature analysis to be used for troubleshooting on products based on the 6800 microprocessor, even if it has not been originally "designed-in".

The 5005A is the latest Signature Multimetre and allows for a variety of functions to be carried out by a single unit. Hewlett-Packard will also feature its 6400 microprocessor development system.

The show has also been the chosen launch-pad for Scan 2 and Scan 3, two compact microcomputers from the stable of Scan Computer Systems. Incorporating a 10 or 20 megabyte Winchester disc drive and a 12 megabyte cartridge tape drive as standard, both units are priced at under £10,000.

From Milton Keynes based Interactive Data Systems comes the brand new business computer known as Oscar. Based on a 64K Z80 CPU, the system is built into a 12-inch screen visual display unit with separate keyboard. It also features 800K-bytes of floppy disc storage and comes complete with CP/M and a selection of software.

Also on display will be the Sarcen microprocessor machines designed for academic, industrial and research applications.

A range of functional cards using a simple 5-volt bus system will form part of the Microsystems Technology (Microtech) exhibit. Up-to-the-moment, low-cost development systems will also be featured, based on the ABC 80 microcomputer, priced at about £2,000.

Full software for this and the systems in the range [illegible] discussed on the stand [illegible] Pascal, Fortran, Basic and [illegible] bler. A clustered multi [illegible] system will be demonstrated [illegible] figured around a single [illegible] store.

Microcomputers [illegible] between 32K and 512K [illegible] will be exhibited by Rair [illegible] Black Box III Range. Of particular interest will [illegible] model 3/30 which features [illegible] in 5¼-inch Winchester [illegible] rage unit. This first appeared [illegible] Compec in November [illegible] but will be available in April.

High resolution colour graphics and sound generating capabilities are just some of the facilities available with Data Applications' personal computer system. Data Applications' industrial microcomputer modules will also be featured.

OHIO IS NOW IN BERKSHIRE

Which will upset geographers but delight OEM systems designers.

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For example, Ohio Scientific's C2-OEM is designed to be the cost effective solution to business and industrial applications which can effectively utilize typical microcomputer execution speed. The C2-OEM benefits from Ohio Scientific's years of volume microcomputer production experience yielding an extremely competively priced medium performance microcomputer. The C2-OEM utilizes the popular 6502 microprocessor operated at 1Mhz clock speed in conjunction with 48K of 450 NS Dynamic RAM memory.

The C3-D mates the electronics of the popular Challenger III triple processor microcomputer system with the cost effective 8" Winchester disk. The C3-D features the three most popular microprocessors – the 6502A, 68B00 and the Z80A. When operated in the 6502 processor mode, the machine executes instructions approximately twice as fast as competitive microcomputer systems. The C3-D incorporates 52K high speed static RAM, serial I/O port, bootstrap and diagnostic firmware, 8" floppy disk for transport and backup as well as an 8" Winchester. The C3-D comes complete with OS-65U disk operating system which is optimized for use with the Winchester hard disk and includes a fast 9-digit BASIC by Microsoft.

The C3C is one of the most economically priced 36 megabyte hard disk systems available in the UK. C3C qualities include three processors, 6502, 6800, and Z80A with software control and full multi user and multi tasking facilities, with floppy disk or Alloy Engineering tape drives. C3C is 'state of the art' in microcomputing.

All systems come with fully operational software and languages include BASIC, FORTRAN, AND PASCAL with CP/M (R) on C3 series machines. Complete application software also available. For details, put in a short-distance call to Ohio on Slough (0753) 75915.

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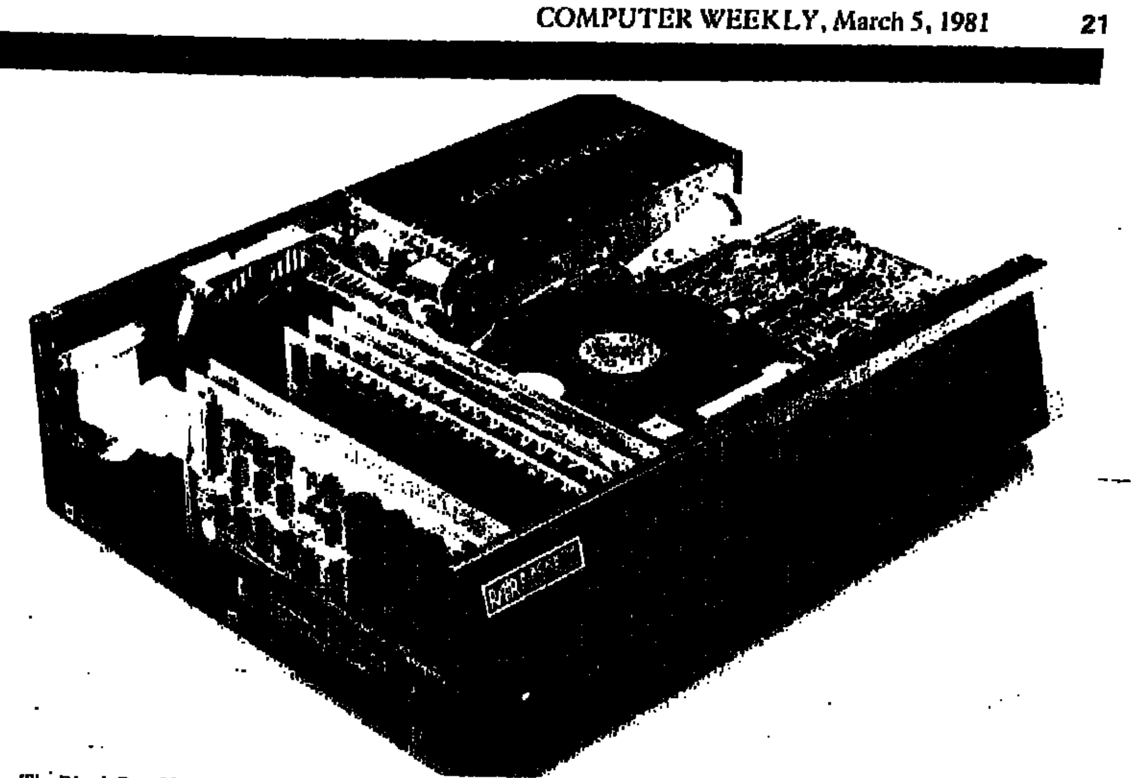
Plenty of fresh ideas at the Wembley exhibition



The Black Box III from Rair features an in-built, 5¼in Winchester disc.

Personal Computers Limited (PCL) will be showing a low-cost answer to the problems of words and data processing. The UK's largest Apple dealer will be showing a self-correcting daisywheel typewriter that will also function equally effectively as a printer interfaced to the Apple microcomputer. This new product allows a systems buyer to acquire a combined word and data processing system for under £3,000, including word processing software.

PCL will also be demonstrating a new sophisticated financial modelling package, designated Micromodeller.

A return visit to Microsystems will be staged by the Digital Equipment Corp. This year one model in the VT100 video terminal range will be demonstrated. This unit allows users to construct a microcomputer in a table-top unit. The increasingly powerful LSI-11/23 will be shown alongside the ubiquitous PDP-11 minicomputer.

From the Wiltshire based Cifer Systems comes a broad selection of visual display units. Among its products to star will be a highly intelligent terminal, the 2684, which is user programmable and based on a dual Z80 microprocessor. It also features built-in floppy disc storage.

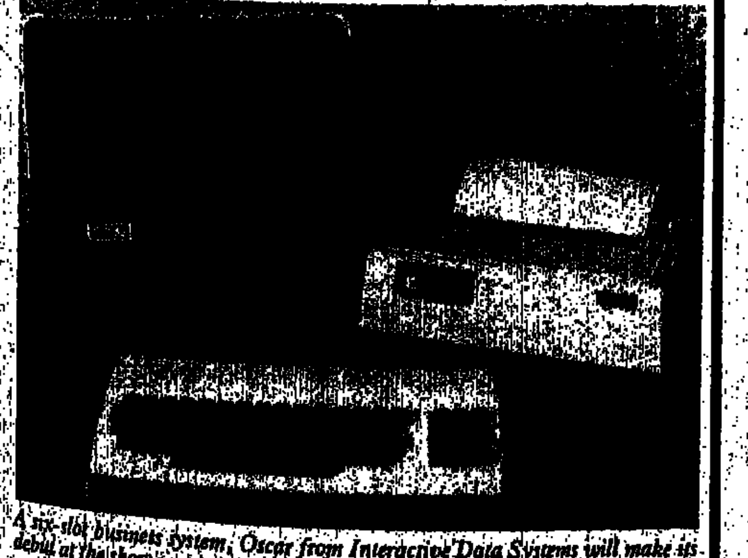
Yet another to use the exhibition as a launching pad will be Britannia Computers, which will be revealing a new range of UK designed and built computers.

The Microword complete Business System incorporates a 64K processor, not to mention a comprehensive software library covering a host of financial and accounting programs as well as word processing. The new Britannia 363 business computer costs about £7,300 and functions as a combined data and word processing system.

From the Bracknell division of Ferranti Computer Systems comes the F100-L microprocessor development system. Based on Ferranti's 16-bit single chip microprocessor, the F100-L incorporates a complete set of hardware and software facilities to allow user programs to be tested and developed with ease.

A range of new EPROM programmers and emulators from GP Industrial Electronics will get their first UK airing at the exhibition. The system 4000 series is suitable for a variety of roles, from the opening software design with in-circuit EPROM emulation through to production programming.

A new operating system from Interface Computer Services has been designed to enhance the capabilities of any Z80 or Z80A based microcomputers that run under CP/M. Interface will also feature the Dinabyte microcomputer and the Wabash range of floppy discs.



business system, Oscar from Interactive Data Systems will make its debut at the show.

A family of standard software modules has been produced to complement Vector International's single Eurocard microcomputer range. The Eurocard series has also been extended by the addition of a 32K dynamic RAM and GPIB interface cards.

On the Transdata stand we will be able to see the CX500 microcomputers. At the bottom end of the league is the CX502 single-user system with floppy discs. At the top end Transdata offers the CX504 multi-user system of hard disc and cartridge tape back-up.

A multi-user, multi-processor networking microsystem will constitute part of Equinox Computer Systems' display. This will be shown with the newly announced Equinox 200 cartridge disc based microcomputer.

Bristol based Wilkes Computing will demonstrate its Gemini systems, which are capable of both data and word processing applications. Ideal for smaller commercial organisations the systems, prices from £9,000, are supported by a variety of financial and accounting software.

One of the newest brainchildren of Research Machines of Oxford will be displayed at Microsystems 81. This will be a 40/80 character VDU board that allows operation of software switches between modes. The board also features a user definable character set of 128 characters, smooth scrolling and screen windowing. Full software support is offered in a choice of languages.

Suitable for both scientific and commercial applications, Midlectron's two general purpose computer systems are based on DEC's LSI-11/23 processor. Other items on the stand will be the Superbrain intelligent terminals.

Peripherals will also form part of the Software Sciences display. The company will highlight its 30/22 integrated terminal, a standalone device for point of sale-type applications. This will be shown with the 9050 Datalogger and a selection of Eurocards.

Forming a part of the Unitech group of companies, Celdis Microsystems will make the most of its Data General product display. Of particular interest is the DG MPT intelligent work station which is based on a 16-bit MicroNova. It is as much at home functioning as a microcomputer as when operating as an intelligent terminal.

Development systems and microprocessor support equipment from a choice of manufacturers can be seen on the Crellon Microsystems stand. A selection of OEM computer boards will be shown alongside two industry standard NMOS microprocessor families from Motorola and Zilog.

An extensive range of modules for the 6800 microprocessor has been promised by RCS Microsystems of Feltham. The series incorpates ROM and RAM and a choice of I/O options including parallel, serial and A-D. All modules are compatible with the Exorciser bus allowing for easier software development.

A selection of component products will feature on the Technitron stand including ProLog Prom programming equipment, Z80 and 8085 emulators and MicroLink ROM simulators.

From the stable of Sinclair Research comes the widely publicised ZX80 personal computer. Priced at just £80 in kit form, this small system is available with a choice of accessories for the enterprising data processing enthusiast.

Small computers and books will feature on the Newbear Computing Store stand. Here visitors will be able to see the Sharp MZ-80K computer alongside a thoroughly comprehensive range of microcomputing book titles.

Books on computing will be available on a number of stands at Microsystems 81. The Computer Bookshop will be represented, as will Dillons University Bookshop.

ICS Publishing will provide an opportunity to "look-in" on its microcomputer training system. These full-colour video courses are carefully scripted and edited.

Another unusual exhibit will be the Bowthorpe Microsystems display. This stand will be dedicated to the working possibilities of microprocessor techniques in different applications, varying from mechanical handling and sorting to administrative control.

Design and consultancy services will also be the theme of the Millennium stand. Millennium Professional and Technical Services offers expertise from professional engineers and programmers to assist in the progress of project work for large developments and also in the selection of systems for the first time user.

Other consultancy service facilities offered at Microsystems 81 will be presented by Phipps Associates of Epsom.

Microsoft is pleased to announce there will be no 16-bit software crisis.

They didn't realize it at the time, but when Bell Laboratories developed the UNIX* Operating System they solved some mighty weighty problems for 16-bit software development. Now Microsoft is picking up where Bell left off and putting the UNIX Version 7 OS on the Intel 8086, Zilog Z8000 and Motorola 68000. (We've got the PDP-11† version too, at a very reasonable price.) We call it the XENIX™ operating system, pronounced "zeenix." Naturally, we are customizing and enhancing the XENIX OS to meet your needs, and we are providing complete support for every customer.

That's great news for the legions of UNIX OS fans, as well as for everyone getting into the 16-bit market. But even better news is that Microsoft can offer XENIX to OEMs at very competitive prices.

16-bit micros and the UNIX OS—that's a powerhouse combination, and only Microsoft has it.

Finally, a state-of-the-art, standard OS.

As the biggest name in microcomputer system software, Microsoft will define the common ground to unite the next decade's microcomputer hardware.

And the XENIX operating system should make life a lot easier for everyone in the business. As the standard operating system, it will eliminate the crises that normally accompany emerging technology: the relearning and rewriting needed for each new machine. The software investments that become outdated the minute hardware diversifies. The wasted efforts.

The XENIX OS (written in the C programming language) will provide long sought-after hardware independence and portability, thus protecting software investments across hardware lines. Switching to a new microprocessor will be easy, since Microsoft will support them all.

Honest-to-goodness UNIX OS. Only better.

The UNIX system well deserves the attention it's received in the past decade. It's a highly sophisticated, interactive, multi-user, multi-tasking system with extensive utilities and accompanying software packages—creating a total working environment. A standard environment.

Actually, the operating system itself is only a small part of the XENIX package. The vast system of utilities, developed over the last 10 years at Bell Laboratories, includes a C compiler, software development tools, function libraries, games, text formatting and typesetting programs, and much more.

And Microsoft's modifications and enhancements make the XENIX OS even more suitable for general commercial applications. XENIX software will fully utilize the powerful instruction sets and large addressing capability of the 16-bit microprocessors.

As with all Microsoft products, the XENIX system will be customized to your exact needs and specifications, then supported, maintained and updated every step of the way.

In addition, all of Microsoft's already-famous system software (including BASIC, COBOL, Pascal, DBMS), will run on the XENIX operating system. XENIX will also run all existing UNIX Version 7 OS software.

A proven leader in worldwide software standards.

Microsoft's role as the leading supplier and authors of microcomputer system software has meant that we've established a number of standards throughout the industry.

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The establishment of a 16-bit standard operating system will be a big step forward for the industry.

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Hobbyist's pastime will become the market of the '80s

One way that micros can carve themselves a niche in the big league, and do to minis what minis did to mainframes, is to become accepted in networks. Alan Wood, managing director of Digitus, examines some of the choices in micro networking.

WITH the wisdom of hindsight we know that minicomputing captured the lion's share of the growth in data processing during the Seventies. Computer manufacturers which were unknown in the Sixties achieved colossal expansion, especially those that stimulated the commercial and distributed systems market.

With the same hindsight, we can now see that the new market of the '80s is microcomputing. The staggering performance of machines like the Apple computer is an indication of things to come. However, an industry that was started virtually by and for hobbyists has woken up to the fact that two of the key growth areas are office systems and micro networks.

For the past two decades, the data processing and communications industries have expended considerable resources establishing communications between remote sites. Meanwhile, as computing devices have proliferated, users on local sites in the accounting department often cannot communicate directly with their fellows in the sales and stock departments.

Micro networks are aimed at meeting the need to exchange and communicate data by stringing computers and terminals around a local site, putting processing power at the user point, sharing data storage and peripherals, and providing the means for one user to send data to another user of the network.

There are as many gradients of network as there are levels of computer and it is important to distinguish betwen the capabilities and objectives of each type, before making comparisons. The simplest micro networks provide the means of connecting together microcomputers of the same family.

These networks operate at relatively low speeds over short distances and fulfil some of the functions hitherto provided by multi-user computers. Examples include the Nestar system for linking Apples and CP/Net for connecting CP/M using micros.

More sophisticated networking systems are addressed to the incompatibles market, that is the intermixing of computers from different families. Their objective is to provide the means of exchanging data in an environment that has grown up with a variety of mainframes, minis, word processors and other terminal devices. The Xeros Ethernet, in some implementations, and the Ungermann Bass Net/One seek to meet the requirement for a universal networking system.

The most sophisticated systems of all provide the local processing capability of the personal computer network, the inter-computer communications of the universal network and the powerful data management, high speeds and sophisticated software to handle voice and document image as well as data communications. The Xionics Xibus/Xinet system is in this category, providing a highly resilient, general purpose resource to unify the varied computing and digital devices in the larger organisation.

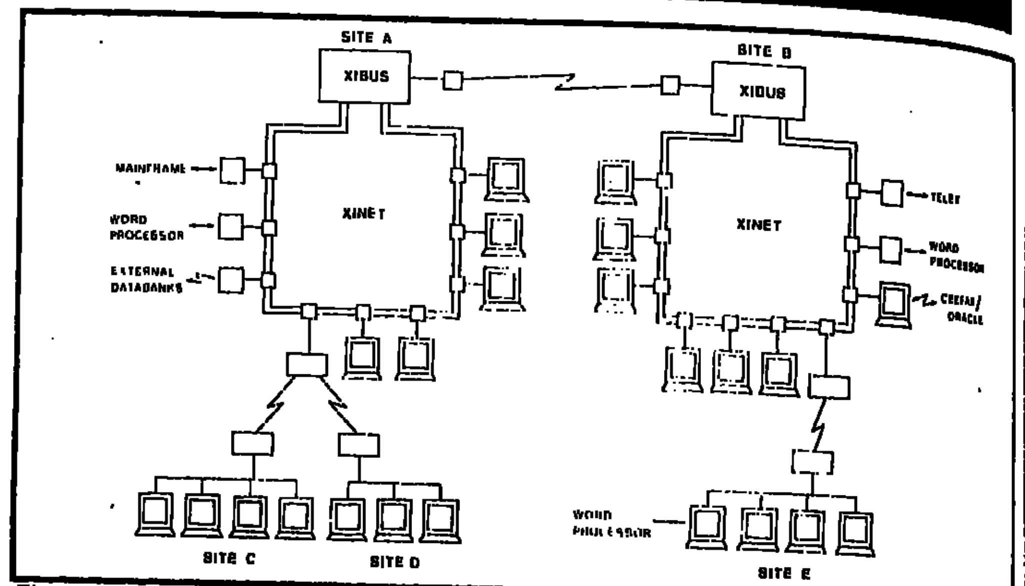

Figure 1. The multiple-site Xibus system

Elements which focus comparison of same family networks include the distance over which micros can be connected, the speed of communication, robustness of the software providing file and record access and the practical number of attached devices. The Nestar system for Apple is limited to 300 metres at speeds of 120K-bits per second and a practical limit of two to three dozen attached devices.

Z-Net, Zilog's Ethernet-like system is one of the most sophisticated of the local networking systems. Two of its provisions increase the efficiency and stability of networking: carrier sense and collison detection. Carrier sense ensures that when a node requires access to the channel, it is not allowed in if another node is transmitting. Collison detection occurs if two nodes transmit simultaneously, in which event both automatically back off and retransmit. Z-Net takes two types of node: a processor or controller station and a shared data station.

Processors are typically Zilog MCZ-2 microcomputers, each with 64K RAM and optional 2.4 megabytes of floppy disc. These microcomputers can operate as standalone devices and each has an interface to Z-Net. The shared data storage is a 10-megabyte cartridge with up to 40 megabytes available. Cabling is inexpensive TV co-axial. Between each station and the cable is a transceiver, a combined modem and transmitter/receiver. Data is sent round the network in SDLC-like packets.

Software available on Z-Net includes a sophisticated data manager allowing both file and record access. Cobol, Basic and PL/Z are available for development. Cost of a Z-Net system depends on configuration but users could start with a two station entry level system and build up to a six station system comprising 6 MCZ-2 microcomputers, 6 transceivers, 6 cables, a shared 10-megabyte disc and printer for under £30,000.

The Xionics system (see Figure 1) comprises four main elements: Xibus, the "backend" data manager and store; Xinet, the network; a workstation or intelligent terminal; and software modules, the library of user tools and interfaces and communications protocols.

Xibus contains multiple processors and Winchester discs interconnected by an internal ring bus. Xinet comprises one or more networks, consisting of intelligent sockets interconnected by multicore cable. Xinet data rate is one megabyte per second. Both Xibus and Xinet are designed for non-stop operation and contain sophisticated internal diagnostics for self-checking and error reporting.

Xibus and Xinet place no restriction on the type of data dealt with. The system can be used for conventional data processing, text processing, messages, digital facsimile images and digitised speech. All such data can be transmitted from one attached resource to another, stored within Xibus and retrieved. Remote Xibus systems can be connected to one another.

The workstation is an optional multi-function terminal for attachment to Xinet. It comprises a screen, special keyboard, Z80 processor, 64K RAM and various interfaces. Its use is not mandatory other than as a console for database administration, and an alternative microcomputer or intelligent terminal can be attached. However, the workstation has a set of user facilities which provide for the creation, alternation, storage, retrieval, searching, formatting, communication and processing of data. Additional facilities include the provision of Micro Focus CIS Cobol, Digital Research CP/M and Microsoft Basic.

The workstation and other devices (terminals, microcomputers, word processors) are connected to the intelligent socket via a communications adaptor. The CA takes up to 16 programmable interfaces and executes or converts a variety of communications protocols.

The Xibus/Xinet user acquires the system with a set of protocols and each organisation commissions any special interfaces required. Mainframe interfaces include IBM 3270, ICL XBM, Univac U100/200, UTS400, Honeywell Teletype. Word processing interfaces include Ontel, Vydec, Philips. Other interfaces include Gandalf switch, Case message switch and links to Ceefax, Oracle, Prestel and other external data banks.

Xibus is a powerful system with a number of features which merit more detailed treatment than a short article will allow. The system is, and needs to be, highly resilient since any organisation coming to depend on this type of architecture must have non-stop operation.

All data is stored twice, on physically and logically separate discs. Every item transmitted is checked at every stage of transmission. All requests for data are subject to authority checks and clearance.

The cost of a Xibus/Xinet system will vary significantly as a factor of the number of attached local and remote resources. Typically an organisation will invest £75,000 in the first instance to set up a site with a fully duplicated 80 megabyte Xibus data manager, Xinet network rings and cabling, intelligent sockets, six 64K workstations and the communications adaptors for the attached resources.

In the longer term, mixtures of networking system will evolve as companies step forward with the new technology. Systems of the Z-Net and Xinet type are not mutually exclusive. It is possible to envisage a situation in which Xibus handles the central kernel of DP requirements, manages the interchange of data between sites and connects to a local Z-Net system handling the needs of one of those sites.

**In the software feature of February 19 a table referring to packaged software was printed. It was extracted from IDC's Eurocast Study entitled Independent Packaged Software Markets in Western Europe 1978-1983.*

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MYTH BREAKERS

BRADFORD ECONOMIC DEVELOPMENT UNIT

Alan Simpson looks at four recent publications dealing with new technology and communications

Word processing guide is just what the wealthy company doctor would order

The International Word Processing Equipment Guide 1980-81. Keith Wharton. 80pp £35. Geyer-McAllister/Covent Garden Publications. Tel: 01-940 7368.

THE ONLY surprise about this book is its price. £35 seems a hefty amount to pay for an 80-page publication, the bulk of which (advertising apart) is a list of products and suppliers.

Cost can be justified if the prospective purchaser takes the opportunity presented by the guide to compare prices and specifications, then acts accordingly.

There would appear to be considerable scope for savings. Text editors, by which the publisher means word processing equipment, range in price from £985 for a Business Data Product to £66,000 for a Nexos range model.

The Meridan line appears to be about £6,500 for a system incorporating a screen and two diskettes or magnetic tape cassettes.

In all other respects the book is pretty much what the company doctor would order, and there are useful obligatory sections on how to choose a word processor, dictation equipment, electronic typewriters, facsimile and photosetters.

Possibly because the book is now in its fifth year of publication, some basic elements of understanding have been omitted.

The section on text editors plunges directly into a world of daisy wheels, jet printers and communication protocols. A basic annual update would be useful for the casual or first-time reader.

More worrying, at least for the first-time buyer, is the suggestion that the product life cycle of equipment designed and marketed for the office environment has shortened dramatically.

Current ranges of electro-office typewriters could be phased out during the next three years. Demand for electronic typewriters could be high and interested prospective buyers are advised to place their orders now.

Given the explosive growth of the electronic office market place, the publisher might well be tempted to publish twice yearly but in the meantime a little more attention to indexing would help.

Not all products listed are covered in the address tables nor incidentally are there any telephone numbers. Communications links appear to favour the Post Office rather than British Telecom.

For those who have a responsibility for purchasing office equipment, however, the book provides a valuable guide to what is available and where to get it.

On an expert level

Introduction to Communication Science and Systems. by John R. Pierce and Edward C. Posner. 390pp. $27.50. Plenum Publishing Corp, New York.

THE SCIENCE of communication is fast becoming an everyday aspect of DP installation life as most computer professionals would agree. Remote terminal displays, time sharing and real time distributed processing are connecting the communication world with that of data processing.

It is not the general rule for DP managers to be omniscient about communication matters like gaussion noise, linear predictive coefficients and biorthognal coding but the need for specialists with that degree of understanding is becoming essential.

The authors are professionals at California Institute of Technology and have an extensive background both as teachers and as research workers in communication technology. They must have made full use of the Caltech library, their references including 1928 data about oscillographic observations on the direction of propagation and fading of short waves and a 1937 paper on variable frequency electric circuit theory.

This work is an addition to a series dealing with applications of communications theory, the complete set of which would serve as a basic collection on the theory and practice of communication science.

Introduction to Communication Science and Systems is directed at the electrical engineering student or specialist with an advanced approach, although the series editor suggests the technical depth is graded, becoming progressively more difficult in the course of the study.

To ensure that the reader has been paying diligent attention, there is a series of problems at the end of each section. As in all good text books, solution manuals are available only to qualified instructors.

Graded or otherwise, the book is aimed towards the expert. Beginners in the high technological world of communications are advised to seek out a basic primer before taking the "introductory" plunge.

For American consumers only

A Consumer's Guide to Personal Computing and Microcomputers by Stephen Freiberger and Paul Chew, Jr 198pp $8.95. Hayden Book Company Inc.

THE PRODUCTION rate of books dealing with personal computers must be challenging that of the micro chip. A consumer's guide is the latest in the long line.

A cover quote describes the publication as one of the hundred outstanding sci-tech books. Alas, authors Freiberger and Chew have not quite produced another Close Encounters, Hitch-Hiker's Guide or Flash Gordon.

The book is more down to earth presenting practical information on over 100 microcomputer products from over 60 manufacturers.

Apart from the Z80, Apple and Pet ranges, companies include Gimix Inc and Parasitic Engineers.

Calculated work

Programmable Pocket Calculators by Henry Mullish and Stephen Kochan 254pp. $8.95. Hayden Book Company Inc.

A CASUAL reader might be excused for wondering what is the future, should there be one, for desk top calculators or even personal microcomputer systems.

Hard copy listing apart, the power, scope and versatility of PPCs is considerable. The book, which concentrates in the main on Hewlett-Packard products, selects the HP 65 "superstar" as the best buy.

When the history of the PPC comes to be compiled, Hewlett-Packard is guaranteed to figure prominently. Having set in train the calculator revolution in 1973 with the HP 65 costing $800, the company produced a regular series of upgrades.

Current star of the pocket space age technology is the HP 33E which sells for about $100.

Progammable Pocket Calculators describes in detail the function of each model, featuring architecture, special factors and program techniques.

Every program for each calculator is incorporated in schematic design, showing how to enter the program and operate the calculator.

For those whose use of calculators is limited to VAT assessment or comparing prices quoted in litres or metres, a PPC is a needless item of equipment.

But students, engineers and computer programmers have found a PPC has become an essential tool of their trade, though it helps if the reader has a ready opportunity to acquire a suitable calculator.

A practical approach

DataBase Design and Implementation on Maxi-and Mini-Computers by Daniel Martin. £9.50 cloth, £4.50 paperback. Van Nostrand Reinhold, 1980.

DATABASE technology is claimed to offer many advantages over conventional approaches to computerised data handling. Despite this, relatively few organisations have taken this route towards integrating their data processing activities.

This situation may be a direct consequence of the lack of suitable practical guidelines for building a database.

If so, this book may help rectify this situation since it applies a totally practical approach to the subject.

There are two general ways of constructing a database: either one uses a commercially-available database management package or one reverts to fundamental principles. This test is devoted to the latter approach.

The book contains only four chapters, the first introducing primitive definitions (database, logical and physical record, block, buffer, pointer, etc.) necessary to understand the subsequent material.

Each chapter is concise and probably adequate for the author's intended audience – the experienced DP practitioner.

Philip Barker

Assessing the impact of micros

The Impact of Microelectronics, by Rada, 100pp, Sw Fr 7.50. International Labour Office. 96/98 Marsham Street, London SW1P 4LY.

PUBLISHED by the International Labour Office, Geneva, this book would perhups have been better entitled "The Impact of Microelectronics on Employment" as it concentrates largely on this aspect.

As the back cover states, "The study identifies the sections of the labour force that are likely to be hardest hit and pays particular attention to the probable effect of the new technology on the international division of labour and on developing countries".

Given the emphasis of impact on labour, the book is well-balanced.

There are several minor technical errors such as "package switching" (for "packet switching").

Another irritant is the confusion between footnotes and references. Both are listed at the end of each chapter and it would have been better for footnotes to appear.

Adrian V. Stokes

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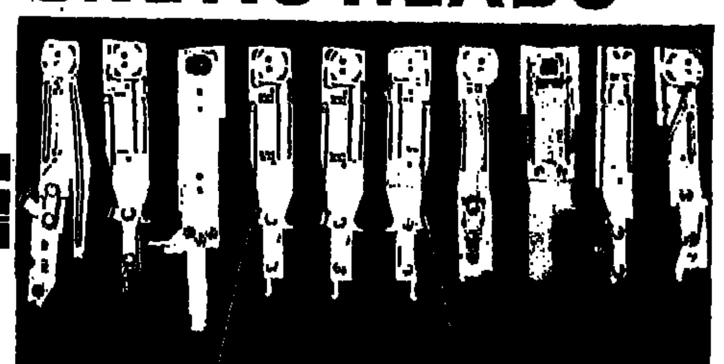

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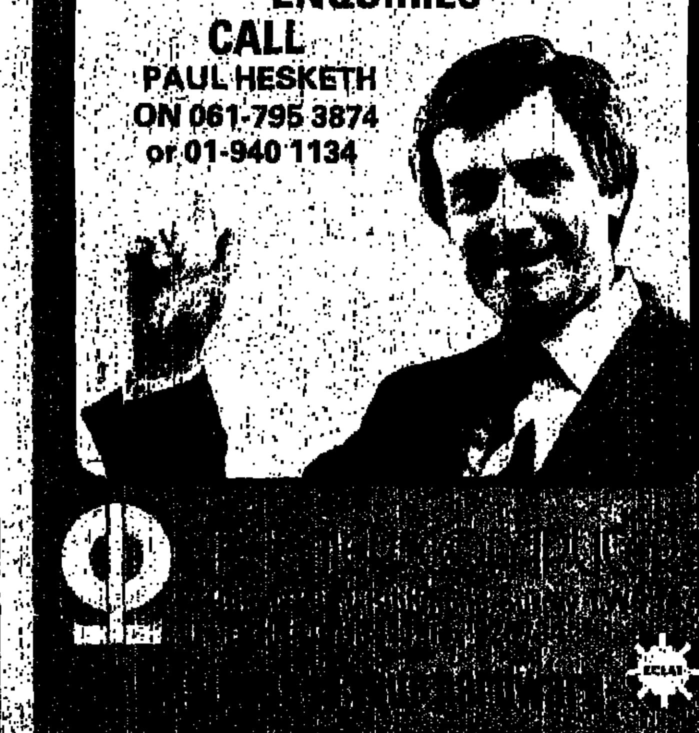

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Candidates are likely to have had over 5 years' experience of software development in a computing environment ideally with a proven software managerial record.

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REF: S/0503

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Applicants should be able to offer in excess of one year's experience of either ASSEMBLER or PASCAL/CORAL. Additionally a knowledge of PDP11/RSX11, HP, Z80/8085, DG NOVA/RDOS will be particularly useful.

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Write giving brief details of your experience to C. Hill, Marconi Avionics Limited, Elstree Way, Borehamwood, Herts. Telephone 01-953 2030, extension 3449. Alternatively, telephone 01-207 3455 anytime. Please quote reference MA80/23.

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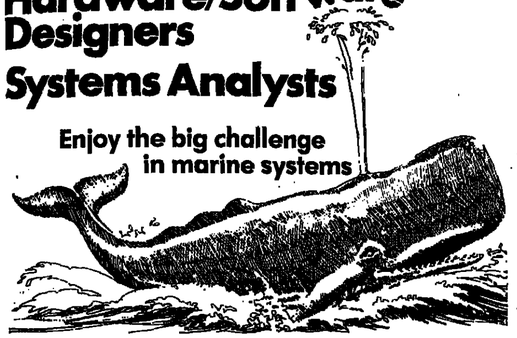

The illustration has nothing to do with having a whale of a time with Plessey...We take that for granted.

The message is all about marine systems development – a fascinating business and of supreme importance.

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(4697)

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JBA

Consultants (RSTS/E)

Zurich, Luxembourg, Frankfurt **c. £16,000+Exps.**

Our client, a Swiss Management Consultancy, with offices in the above locations wish to recruit professionals to strengthen their current project teams involved in the development and installation of banking systems, throughout Europe.
Ideal experience would be 3 years Basic+ or Basic+2 in a RSTS/E environment as a senior member of a development team.
This being a permanent overseas appointment, candidates must be self motivated, adaptable and be prepared to travel between project locations when the need arises.
Contact: Brian Postles

Analyst/Programmer

London **c. £11,000+benefits.**

Our client, a well established commercial organisation, a household name, wishes to recruit an Analyst/Programmer to work in the System Support Team which has a responsibility for the efficient and effective running of live applications and the provision of an enquiry facility to the User Departments.
Candidates should have around five years experience in an IBM OS environment with a substantial background using PL/1. Knowledge of financial/accounting systems would be an obvious advantage.
Contact: Jim Baker

Consultant

London **Quality Assurance** **to £10,000**

Our client, a very successful consultancy has grown steadily in the extent and complexity of its operations. They are currently seeking a Software Engineer with the experience and ability to make an immediate contribution in a demanding team environment.
The QA team works in close co-operation with Project Leaders and therefore have an opportunity to acquire a unique overview of the company's activities.
The appointee will play a significant role in the audit and review of technically advanced applications with special reference to Defence projects.
Applicants will be able to demonstrate a successful technical background which will include an appreciation of electronic engineering and QA procedures.
Contact: Margaret Stevens

Programmers

City **To £10,000**

Our client, a highly reputable British Merchant Bank wish to recruit 2 programmers to join a small team responsible for the introduction and development of a comprehensive range of banking and financial applications.
Applicants should have at least 4 years experience in d.p. preferably gained on Hewlett Packard equipment together with a good working knowledge of COBOL. Familiarity with IMAGE or TOTAL databases is essential. Special preference will be given to candidates with a banking background. Usual banking benefits apply.
Contact: David Hendry

COBOL Programmers

Sussex/Hampshire **c. £9,000**

We are in the process of recruiting competent COBOL Programmers, for two of our clients, both well established systems houses.
A minimum of three years sound COBOL experience, preferably from an on-line or real-time environment with particular emphasis on ICL ME 29 or 2900 series using IDMS.
Consideration will be given to candidates with a good COBOL programming background using other hardware. Applications experience should be accounting and financial.
Opportunities will exist to progress into analysis but it is essential to have a preference to stay in programming for the immediate future.
Contact: Janet Chilvers

Communications Programmers

London **c. £8,000**

We have been retained by an international consultancy organisation, who are expanding their development in Videotex systems, to recruit two software programmers to be involved with this exciting application.
Applicants should have at least two years' programming experience, preferably with FORTRAN on PDP11's or VAX. IT's in a communications environment. Knowledge of X25, 3270, packet/message switching would be an advantage. Ability to work with users with minimal supervision is essential.
The job involves colour, business graphics and networking.
Contact: Jim Baker

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YOUR CONTACT Les Thompson

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To work with the above Software Engineers on the microprocessor systems, transfer of digital data and memory organisation.

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If you have the qualifications to fill any of the above vacancies then contact DAVID WAIN on 021-643 1994.

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(4727)

CANADA

Systems Professionals

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A major Canadian mining organization — Head Office, Toronto — is entering an exciting new phase in the EDP field. Their requirements are for a **Systems Analyst** to act as the leader of a team to develop new systems. Three to five years of progressively more responsible experience as an analyst in a large main-frame environment with background in COBOL and/or FORTRAN; training in Systems Development methodologies; and some supervisory experience, would be ideal.

Programmer/Analysts are also required to provide design and programming expertise to their development teams. The individuals they seek are currently Programmer/Analysts using COBOL and/or FORTRAN. They are able to work independently and to respond to user requests judiciously.

These positions provide a rare opportunity to ply your craft and hone your talents with a company that has a stake in technological innovation, and a commitment to developing good people capable of supporting that stake.

If you seek such opportunities, please reply in confidence to Mrs. Susan Fox, Toronto, referring to file 1630 indicating the position of interest.

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Consultants in the Management of Human Resources

(4706)

SWALCAP
(UNIVERSITY OF BRISTOL)

A PROGRAMMER

is required to join the SWALCAP team, based at Bristol University. The Unit is self-financing and provides online services to a growing number of libraries in Wales and Southern England. The existing network configuration involves a Xerox 530 at the central site, with a Computer Automation LSI 2/20 acting as a communications processor. A variety of terminals in each of the members' libraries are linked via their own LSI 2/20 minicomputers and Datel 2412 lines to the central site. A Systime 6700 system, based on a DEC PDP 11/70 was delivered in January 1980 to provide additional central processing capacity. Work has commenced on the development of new software, written largely in Fortran, to run on the PDP 11/70 under the RSX-11M-PLUS operating system, and the Systime teleprocessing system SYSTEL.

The post provides an ideal opportunity for involvement in all aspects of real-time systems. The work will be challenging and will involve both systems and applications programming using Fortran and MACRO-11. Experience in one or more of the following areas would be an advantage: Fortran, MACRO-11, RSX-11M, real-time systems, communications.

The starting salary will be at an appropriate point according to age, qualifications and experience on the scale of £6,505 to £9,695 (under review).

The University does not issue application forms. Application should be made by letter and should include the names and addresses of three referees. The letter should be accompanied by a curriculum vitae setting out date of birth and, in chronological order, details of education and subsequent career with qualifications and present salary, and previous appointments. Applications should be sent within fourteen days of the appearance of this advertisement to the Registrar and Secretary, University of Bristol, Senate House, Tyndall Avenue, Bristol BS8 1TH, quoting ref. [illegible]. Additional enquiries regarding the post may be sent to SWALCAP, Wills Memorial Building, University of Bristol, Queen's Road, Bristol BS8 1RJ, or may be made by telephone to Richard Hudson and Malcolm Green on (0272) 24161, Ext. 616.

(4575)

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VPN Employment

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Please write with brief career details to John Heath, ITT Creed Limited, Hollingbury, Brighton BN1 8AL or telephone Brighton 507111 Ext. 3514 for an application form. (Answering service out of hours)

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Our Client **Dorbyl Limited**, is looking for **Project Leaders** to develop their manufacturing, production control and financial reporting systems. They have IBM 4331, 4341, Burroughs 1860, ICL ME29 and various mini computers.

Dorbyl is situated south of Johannesburg on the banks of the Vaal river, in the city of Vanderbijlpark. This area is well known and extremely popular for its water sports facilities.

The remuneration package for successful candidates is generous and relocation assistance will be provided.

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In the first instance, telephone **Dick Glazebrook** on **01-405 0442**. Or send a brief CV for his attention to: High Holborn House, 49-51 Bedford Row, London WC1V 6RL. Any approach will be treated in strictest confidence.

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(4730)

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The successful applicant will be a trained systems analyst who understands the protocol of project management and management information systems. Programming experience using a high level language is essential and knowledge of APL is desirable.

You will be supporting a comprehensive EDP Development Plan which has broad objectives of improving customer service, sales, marketing and management information. To implement the plan several projects are phased over the period commencing with enhancements to existing systems and including total data analysis, investigation into automated office systems and redevelopment of Financial, Sales and Marketing, and Information Systems.

IBM 43/31

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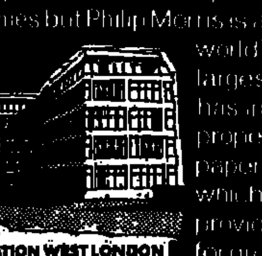

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Wise counsels smooth path to employment

by Robert J. Peeling, managing director of CPR Consultants Ltd.

RECRUITMENT in the North of England is an emotive issue, seen in the light of redundancies caused by a deep recession which has the consequent effect of creating severe financial restrictions.

Even if redundancies are avoided head counts are looked at closely, recruitment ceases and natural wastage is allowed to occur.

The general effect on the computer industry has been patchy, computer users probably being under the tightest restriction, presumably because of their proximity to the consumer market-place.

This is not to say that computer manufacturing and supply organisations have escaped serious setbacks, as evidenced by the large-scale redundancies which have taken place.

Some supplier areas are booming, particularly micro manufacturers and OEMs which are springing up in true entrepreneurial fashion all over the country.

Little media space is given to the considerable number of success stories while every "snippet" of despondency gets its full share of column inches confirming the old maxim that only bad news is news.

Redundancies create difficulties both for the professional recruitment organisation and the potential employer.

The market becomes flooded with a whole group of people having a whole range of skills to offer from trainee programmer through to general manager. Understandably, the redundant personnel react in various ways ranging from mild panic to hysteria.

Individually, they assemble career details hurriedly and send them off to every conceivable computer-related source of employment besides contacting every personnel organisation they know.

The results of this approach are apparent in the personnel industry where chaos prevails with various organisations producing the same details on the same man and then putting him in front of the same potential employer.

From the employer's point of view, his desk becomes littered with various resumés depicting the same potential employer in many different fashions.

Again understandably, the would-be employer scoops the whole pile of paper into the waste-paper basket and waits for everything to settle down.

When a consultancy is approached by redundant personnel our first job is to calm them down and try to put them back into a rational frame of mind.

After this first step, we will try together to identify the comparatively few companies which should be interested and only then do we endeavour to put a fully-detailed and coherent resumé in front of as few people as possible.

Our own area of recruitment expertise covers sales, software and engineering.

The consultant vets all applications coming into the organisations, sifts out the "dross" and interviews up to the final selection stage, short-listing potential candidates.

The recession has had the effect of causing an overseas recruitment market boom as countries such as South Africa, moving into high-technology installations rapidly without home-grown experience, realise that the UK has such experience to spare.

Suddenly our trade journals are taken up with 25 per cent of advertising space devoted to lucrative contracts somewhere in the sun.

This sort of proposition is very attractive if you have been made redundant amidst gloom and despondency, and inevitably the UK suffers from a drain of expertise which we can ill afford when the market inevitably picks up.

Another area that is hard-hit traditionally is that of research and development, essential to companies intending to maintain viability in a market renowned for its speed of technical advancement.

R & D is always one of the first functions to fall in the face of financial cut-backs because it can show no immediate productivity.

By the same token, it is not an immediate business, the lack of substantial investment in this field only becoming apparent months or even years after its cessation; the erstwhile lucrative contract field is also feeling the cold.

An immediate financial saving can be made by any company using contract staff by cutting or not renewing the contracts in force.

The effect upon the recruitment profession is that many highly-experienced software and support personnel, used to contract work on a free-lance basis, are suddenly looking for permanent situations within the industry.

It is essential that their motivation is explored carefully as the last thing any potential employer wants is a highly-experienced new employee using the firm as a stepping-stone to the point where the contract market becomes lucrative once again.

It is said that if a company can operate successfully in a recession then its success is guaranteed in normal times.

In the light of this we find it reassuring that within our own industry there are many companies which, having "honed" and streamlined themselves, are not only operating successfully but are in an expansionist frame of mind.

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Application forms and further details are available from The Personnel Officer, Sheffield City Polytechnic (Dept. CW), Halfords House, Fitzalan Square, Sheffield S1 2BB or by telephoning 20911, ext. 361.

Completed forms should be returned by 20th March. (4751)

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Applications are invited from suitably qualified persons for the post of Programmer within the Administrative Data Processing Section of the Registrar's Office. All administrative systems are currently run on the University's ICL 2976 computer. A DEC PDP11/34 minicomputer system is being purchased. The person appointed would be involved in both the maintenance of current systems and the new programming applications which are planned.

Applicants should hold a University degree or equivalent professional qualification. Preference will be given to those with experience of programming or analysis in a data processing environment but prospective graduates in Computing Science may apply. Salary will be on Grade 1A of the scales for Other Related Staff £5506-£9595, under review), with initial placement dependant upon qualifications and experience.

Further particulars may be obtained from the Secretary of the University Court (Room 18), University of Glasgow, Glasgow G12 8QQ, with whom applications (8 copies), giving the names and addresses of three referees, should be lodged on or before 20th March, 1981.

In reply please quote Ref. No. 4761/1. (4746)

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UNIVERSITY COMPUTING SERVICE

Applications are invited for a post of

COMPUTING ASSISTANT

in the University Computing Service. Applicants should have a good honours degree or equivalent, preferably together with at least two years' relevant postgraduate experience. A higher degree could be an advantage. The appointment will be for a fixed period of up to three years.

The Computing Service is responsible for the provision of computing facilities to all departments within the University and has recently acquired an Amdahl V7 mainframe computer and a PRIME 750 Computer. The successful candidate will work principally within the Applications Group which develops, maintains and advises on the use of applications software.

Salary at an appropriate point on the IB Scale for Other Related Staff: £4795-£8095 (under review), according to age, qualifications and experience.

Application forms and further particulars may be obtained from the Registrar, The University, Leeds LS2 9JT, quoting reference number 48/35/C. Closing date for applications: 30th March, 1981. (4736)

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The Polytechnic of North London

POSTS IN MICROCOMPUTING
PROGRAMMER

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A Programmer with initiative is required to join the small Management Information Systems team to complete the implementation of existing programs, set up these as a multiuser system and subsequently develop other areas. Most programs have been written in C Basic. Experience in this particular language is not essential but experience of high level language programming is required.

TEMPORARY PROGRAMMER/RESEARCH FELLOW

A graduate is required until the end of September 1981 to help complete a research project involving the development and programming of a distributed micro computer based system for handling student records. Some high level language programming, not necessarily gained on micro computers, is essential.

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The Polytechnic Computing Service operates a Microcomputing Centre for teaching and research, containing a wide range of equipment, e.g. Nascom, Pet, Apple, RN 380Z, Vector Graphics, and with facilities for colour graphics, digitising and plotting. Planned developments include resource sharing ring systems. Further technical support is now required in equipment maintenance, advisory services to users, and applications software. A Technician Grade 3 post is now available, for which the qualifications are ONC or OND or 2 'A' levels or Ordinary City and Guilds or equivalent. At least three years' experience (including training period). A Programmer appointment could also be available for graduates (or equivalent) with some programming experience preferably in the microcomputer field.

The Polytechnic's large DEC 10 will play an important back-up role and in all these posts there will be opportunities to gain experience of interfacing micros to mainframes at systems design and programming levels.

Salaries are on the following scales (which include London Weighting), starting point will depend on qualifications and experience.

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Further details and applications form (please state post in which interested) from Head of Computing Services, The Polytechnic of North London, Holloway Road, London N7 8DB. Telephone 01-607 2789 ext. 2295.

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Contract Assignments

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ME 29 COBOL Analyst Programmers
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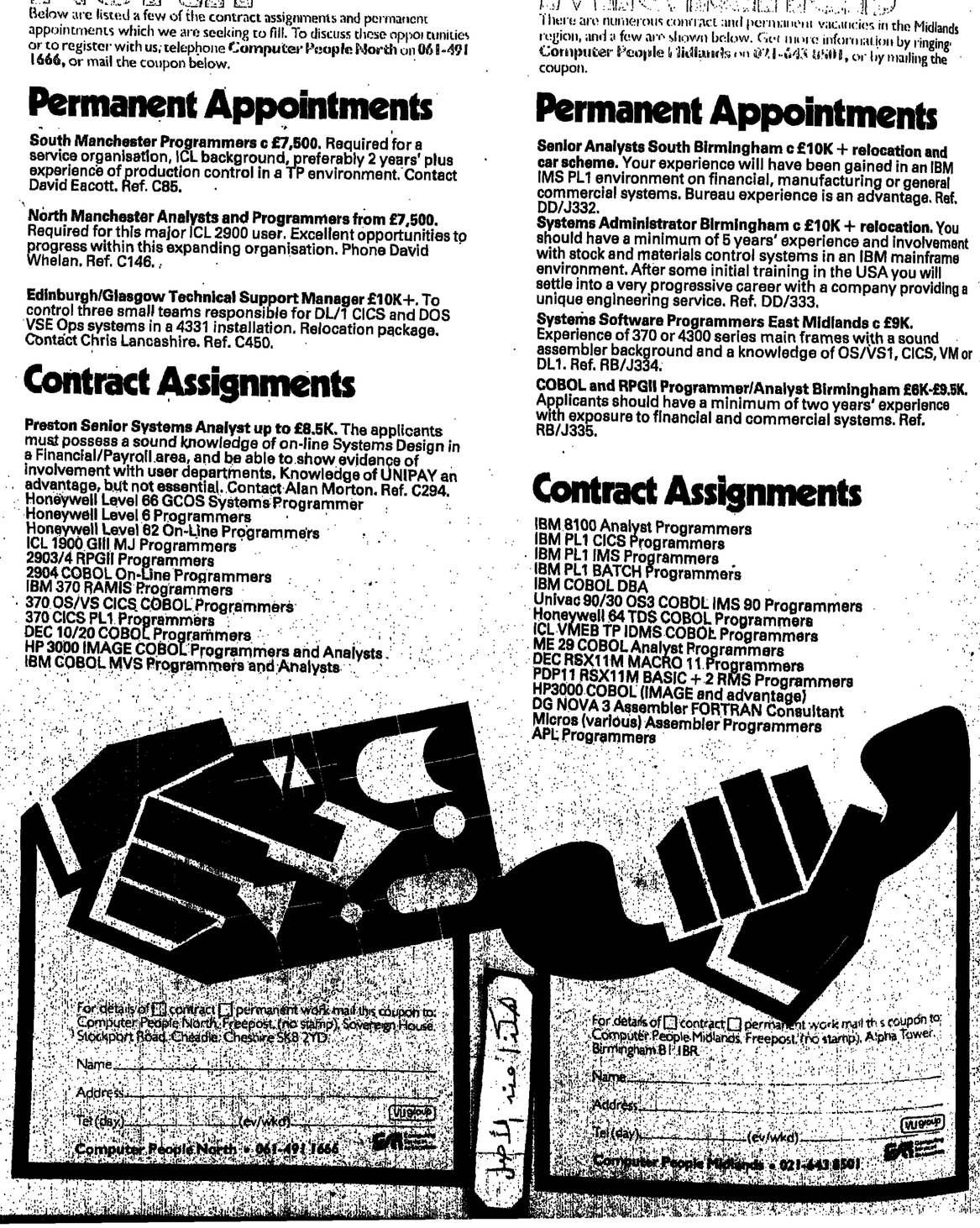

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Contract Assignments

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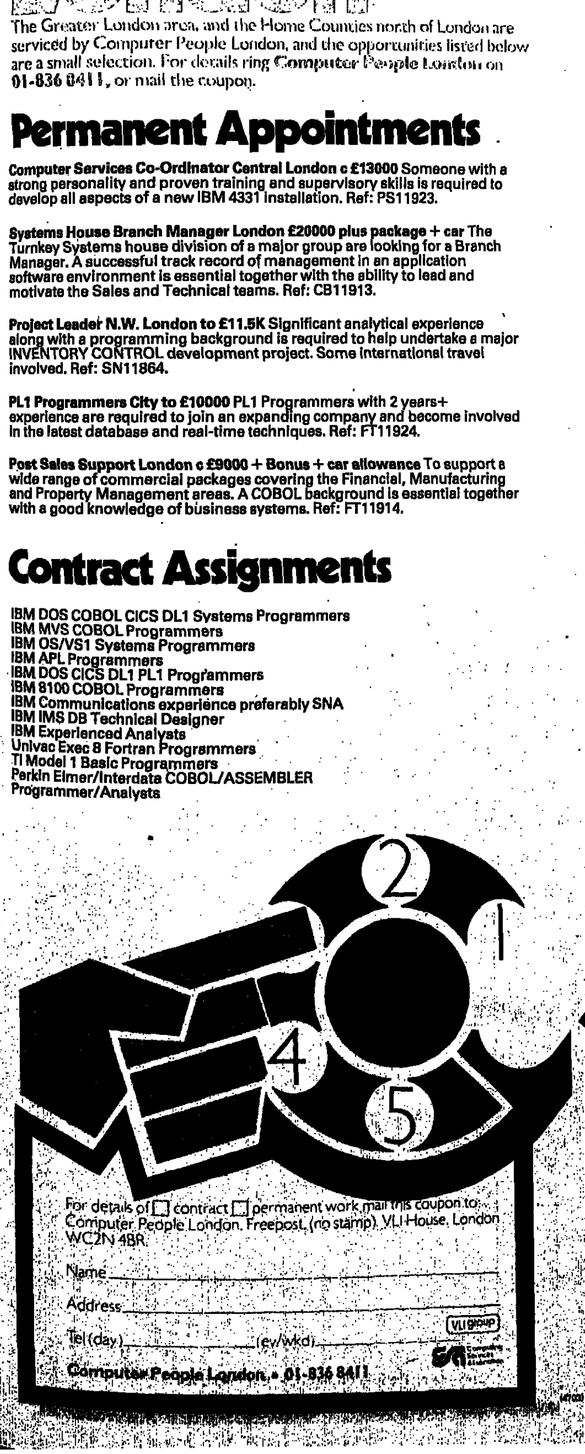

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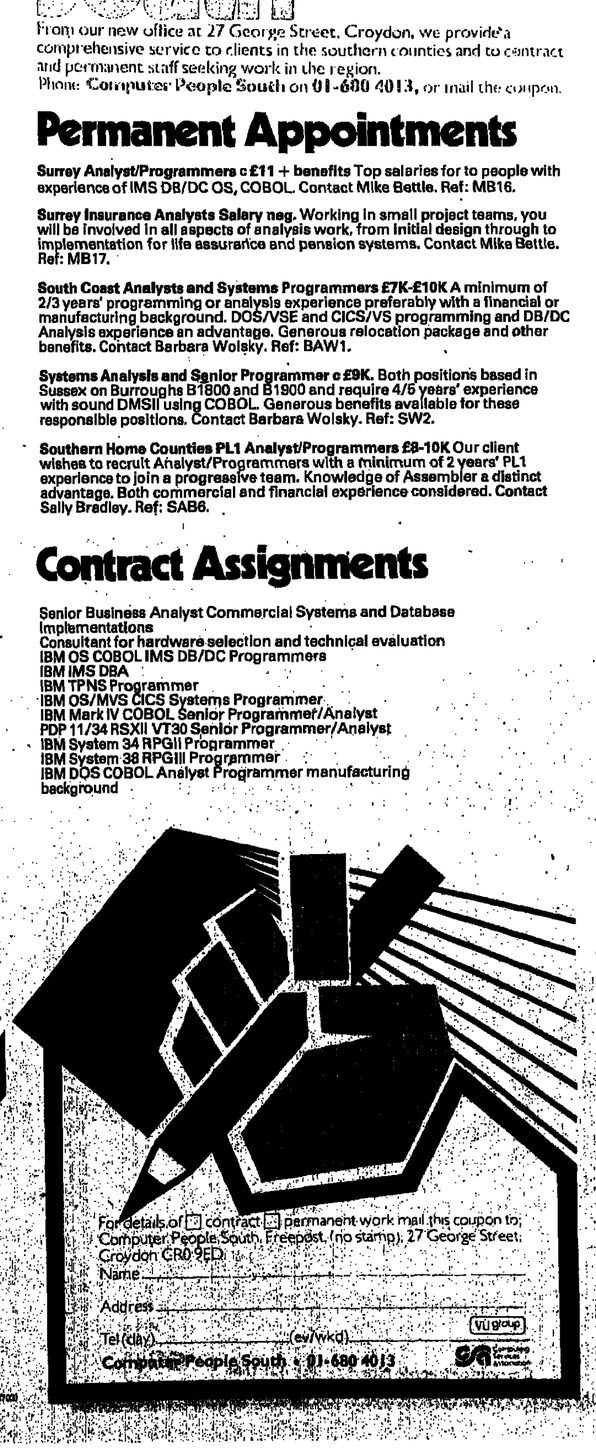

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(4702)

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DALROTH *computer personnel*

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Definition of a new range of computer systems

70,000 - 100,000 DM per year

Dietz is a leading West German mini computer manufacturer who currently wish to define the architecture for a new hardware range. The Company is based at Mulheim, which is a pleasant rural location in the Dusseldorf area.

The system will be based on a high-level object orientated multi-micro-processor architecture and will include special purpose peripheral attachments that will match the sophistication of the mainframe system.

The following personnel are required:

Operating Systems Specialists

Ideally candidates will have a minimum of 7 years' experience including file store organisation, task management, virtual memory management, etc, and/or high-level job management interfaces both at the hardware and software levels.

Compiler Specialists

This is a special assignment involving the design and implementation of a compiler porting system for the new range architecture. There will be a very close working relationship with the Operating Systems team. Ideally candidates will have extensive compiler design and run-time environment experience.

Opportunities exist for travel within Europe and also to the USA. German would be useful although this is not essential. Candidates with similar or related software backgrounds are also invited to apply as additional software personnel will be required for development and implementation later this year.

An attractive relocation and benefits package will be offered with these appointments.

For further information please contact Roger Allington on 01-493 2947 (office) or Berkhamsted (04427) 2299, evenings/weekends. Please quote Ref. CW9848/2

DALROTH & PARTNERS LTD. 4 HALF MOON STREET, LONDON W1.

Targa

SYSTEMS ENGINEER

CITY — to £10,500

A superb opportunity to join a flourishing BANK in the City. It is essential that the successful applicant has the maturity and ability to cope with a range of duties which include generating Operating Systems, Database and applications support, troubleshooting and software enhancement. Definite prerequisites are extensive knowledge of COBOL gained in a VS environment, whilst a background which includes DOS/VSE, POWER and CICS would be advantageous. The usual BANKING BENEFITS including MORTGAGE SUBSIDY apply. Ref: R3274

ANALYSTS

CITY — c. £11,000

Due to continued expansion, a large ICL installation have vacancies for experienced SYSTEMS ANALYSTS. Applicants must have a formal background which includes one or more of the following application areas – Finance, Admin, or Operation Research. The prime programming languages are COBOL and FORTRAN. An excellent range of benefits is offered, together with a secure career offering plenty of scope for personal advancement. Ref: R3265

NETWORK CONTROL

c. £9,000

A large site based in South London requires an experienced person to act as a Network Support Assistant within their telecommunications area. A large network of approximately 50 lines serving 900 terminals is the size of the task facing the successful applicant. A solid knowledge of Telecommunications, coupled with good Operations experience, probably in excess of 7 years, would be the minimum requirements. Company perks include a car allowance. Ref: 3250

SENIOR OPERATOR

IBM MVS — c. £7,000

An International Manufacturing Company requires an experienced Operator for their large multi-machine computer centre. A minimum of 2 years' experience on medium to large IBM systems with knowledge of Teleprocessing and Real-Time systems is a pre-requisite for the position. A three shift system is currently in operation with voluntary overtime at weekends. Company benefits include staff shop and free meals on shift. Site based in South London. Ref: 2277

OPERATOR

ICL — £5,000+

A City company requires an Operator with 2 years' experience on a 1900 configuration. A two shift system is currently in operation on this site. Perks include 18 days holiday in the first year, free meals and S.T.L. Ref: C3269

OPERATOR

ICL — £4,500+

A Hertfordshire Engineering Company has a vacancy within the Computer Department for an Operator. The applicant must have 1 year's EXECLS experience and be prepared to work a three shift system. Ref: C3271

PROGRAMMER/ANALYST

WEST END — c. £8,500

An interesting vacancy has occurred for a person with 2-3 year's COBOL programming experience, together with a small amount of analysis. The company is an expanding user of IBM equipment and from the applicants point of view a knowledge of CICS and/or TOTAL database would be particularly advantageous. Interesting applications and good fringe benefits are offered. Ref: R3233

ANALYST (BANKING)

CITY — to £11,000

If you have three years' Systems Analysis experience in a BANKING environment and are communicative, with ideally a background in O & M, then we would like to hear from you. Our client is one of the most successful MERCHANT BANKS in the City and offers a generous salary together with the usual excellent banking FRINGE BENEFITS. Ref: R3200

PROGRAMMERS

CITY — £6,500-£8,500

A minimum of one year's BASIC+ 2 experience in a RSTSE or RSX11M + environment is required for two of our city-based clients. Both financial institutions, they offer secure positions in development teams together with outstanding opportunities to progress and excellent benefits. Ref: R3179

SHIFT LEADERS

HONEYWELL — c. £7,000

A well-known manufacturing company based West of London requires Shift Leaders with a minimum of 18 months' experience of Honeywell mainframes or minis using GCOS. A knowledge of LEVEL 6 would be an added advantage but not essential. Excellent company benefits are provided and opportunities exist for some overtime. Ref: 3284

OPERATOR

ICL — £7,668+

A site in S. London requires an Operator for their 2900 Hardware. The applicant must have 2 years' VME/B experience and be prepared to work under a 2 shift system. PROMOTION PROSPECTS with this company are unlimited. Salary EXCLUSIVE of shift allowance. Ref: G3253

OPERATORS

ICL — to £6,000

A City-based firm of Commodity Brokers has a requirement for 2 operators for their 2904 configuration. The vacancies they wish to fill range from a Junior Operator with 6 months' EXEC2S experience to a Senior Operator with 3 years' experience of EXEC2S plus a little JCL. 2 shifts are operated and good perks are offered, including Bonus and LV's. Ref: C3268

OPERATOR

BURROUGHS — £6,000

A company based in Oxford has a requirement for a Senior Operator for their B800 machine. The successful applicant will join a small friendly team and be expected to perform tasks ranging from routine Data-entry to deputising for the Operations Controller. Burroughs experience is NOT ESSENTIAL but is obviously useful. This is a DAYS ONLY position. Ref: 3270

TARGA COMPUTER SERVICES

6 Liverpool Street, London EC2M 7NH — 24-hour Ansaphone — 01-382 9941

(4713)

ALSYS
ADA LANGUAGE SYSTEMS

A French company recently founded by Jean Ichbiah, principal designer of the Ada language requires a:

PROGRAMMING LANGUAGE SPECIALIST

who will be involved in Ada related activities such as:

- standardisation of the language
- relations with implementers
- formal definition
- training (seminars, computer-aided, training project)

based in Parish area.

Send application letter and resumé to:
René BERETZ, ALSYS, 45 rue CARNOT
78000 VERSAILLES, FRANCE

(4682)

ANALYSIS PROGRAMMER

We are an international company in the consumer electronics field, and wish to appoint an

ANALYSIS/PROGRAMMER

In order to enhance our in-house expertise.

The successful applicant will be involved in developing our warehouse control systems on a Honeywell Level 6, which is based at Milton Keynes.

Following the successful implementation of the above, it is our intention to install a second system at our H.Q. in Wembley to carry out SOP, Stock Control, POP and Shipping Control.

Applicants should have experience COBOL, a knowledge of Screenwrite and the IBM 4300 would also be desirable.

Applications in writing are invited in the first ance.

Personnel Manager, Binatone International Ltd., Beresford Avenue, Wembley, Middx. HA0 1YX

BINATONE

(4706)

Leading international service corporation with an extensive telecommunications network has the following vacancy:

Telecommunications consultant (m/f)

who will report directly to the Network Manager and handle the mainly negotiating but also scientific and administrative aspects of this highly challenging but rewarding job.

Specific duties include the preparation of meetings, negotiations and work in close relationship with P.T.T. and other administrations in view of optimizing network availability and performance.

He will have to attend all meetings of interest to the corporation and submit reports together with proposals on action and strategy. He must also collect the necessary documentation and information and establish contacts with other organizations in our own and related fields.

Successful performance in this position will require a highly versatile personality in the 30-50 age group and with a scientific university degree.

He will need solid experience in negotiations with and internal operations of bodies such as P.T.T., C.C.I.T.T. or O.E.C.D. on European and/or international levels. Also thorough knowledge in the fields of data communications, telecommunications and modelling technics.

The job is based in Brussels and involves travelling world-wide. Salary terms will be commensurate with professional qualifications and experience.

Please send applications to:
Jerry Rubin, Personnel Consultant,
Chaussée de La Hulpe 185,
B-1170 Brussels (Belgium) under reference number 320.

(4717)

SENIOR ANALYST PROGRAMMERS

We are looking for personnel who can work with minimum supervision, able to gain client confidence and enjoy the challenge and variety of work provided by a large software consultancy.

Essential qualities are:
- ability to supervise a medium sized project and perform to estimates,
- detailed experience of at least two commercial languages (preferably COBOL and BASIC) and familiarity with several ranges of hardware/operating systems,
- ability to provide technical/analytical guidance.

Positions are London based with salary range up to £11,150 p.a. plus bonus.

For details please contact Bernard Taylor on 01-388 0036 or write to:
Fraser Williams (London) Ltd., 38 Warren Street, London W1P 5PD.

Fraser Williams (London) Ltd.
38 Warren Street, London W1P 5PD
Quote Ref. CWBT83.

Fraser Williams
Recruitment & Training

DAVID CONNOR & ASSOCIATES LIMITED

PROGRAMMERS

Vacancies exist in this fast expanding consultancy for COBOL Programmers with a minimum of two years' practical experience. Applicants must have a good proven track record with the ability to work without supervision. Experience of NCR and Honeywell would be an advantage but not essential.

TRAINEE PROGRAMMERS

Opportunities also exist for trainees with HND in computing or similar qualifications.

Write in confidence or telephone:
D. Connor, Haslemere (0428) 3081
10 Petworth Road, Haslemere, Surrey

(4682)

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The Company seeks two Senior Shift Leaders, with a minimum of two years' operating experience on Level 66/DPS computers, and two Junior Operators, preferably with some operating knowledge, to become part of a growing and dynamic Operations team.

All Operators will be encouraged to further their D.P. knowledge and will be given individual training.

Successful applicants will work alternate weekly shifts (three shifts in the near future) Monday to Friday and can expect a competitive salary.

Please write with details of your career to date to:

Operations Manager
ENTERPRISE AIR-TIME SYSTEMS LTD.
Thameside Computer Centre
Ferry Works, Summer Road
THAMES DITTON, Surrey, KT7 0QJ

ENTERPRISE
Advanced Media Marketing Systems

(4716)

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Further details and application forms may be obtained from the Assistant Director (Administration), Trent Polytechnic, Burton Street, Nottingham NG1 4BU. The closing date for the return of applications is 16 March, 1981.

(4655)

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Applicants should have had previous experience in the overall running of small to medium sized computer installations, preferably using IBM equipment and should have a good understanding of the use of the appropriate software and operating systems.

Please apply in writing or by telephone to:

Miss Linda Sowerby on 01-947 7411 at
CROSS COMPUTER GROUP LIMITED
Barry House, 20-22 Worple Road
Wimbledon SW19 4DH

(4740)

UNIVAC 1100 DMS SPECIALIST

We are looking for a DMS specialist to work as a consultant in West Germany, district of Hanover, for a contractual period of not less than two years. The successful candidate will be working with a highly qualified team of international specialists on one of the largest U1100-Systems in Europe. The remuneration will be over D2,000 per month.

The candidate should have at least 7-10 years of experience with DMS, both on the Systems and on the Applications side and should be willing to learn German, although all the potential working colleagues master the English language.

Applications to Computer Weekly, Box 1132.

(4700)

★ IMS IMPLEMENTATION ★
★ Wiltshire ★

Contract or permanent early start assignment to join our client's IMS Group responsible for database implementation. Responsibilities given will depend upon type of experience, although thorough knowledge of IMS in a DBA or systems programming capacity is essential.

Contact Bob Carr on St. Albans (0727) 34301 (24-hour ansafone).

Fraser Williams (London) Ltd., 34 Canberra House, 17-19 London Road, St. Albans, Herts. AL1 1LE or contact Bernard Taylor on 01-388 0036

(4741)

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New companies have been formed to pursue our international interests in Exploration, Oil (refining and marketing), Chemicals, Minerals, Coal, Gas, Nutrition, Detergents and other new ventures.

Senior Communications Technologist

City — up to £12,000

This challenging career opportunity in the Computer Services Department is for a graduate engineer or equivalent with at least 4 years' experience of telecommunications and computing, ideally including knowledge of UNIVAC, DEC, IBM and ICL hardware and operating system software.

Responsibility will be for providing and maintaining terminal and communication facilities in our Moorgate headquarters, where there are over 400 users of terminal facilities. There will be a need to liaise with other sections to ensure that the facilities to be provided are technically feasible, operationally desirable and properly maintained.

Career development opportunities with BP are excellent. Salary level will be dependent on qualifications and experience. Benefits include non-contributory pension, excellent subsidised restaurant and assistance with re-location expenses where appropriate.

Please write with details of qualifications and experience, quoting reference FY.958, to: Sue Bartholomeou, Central Recruitment, The British Petroleum Company Limited, Britannic House, Moor Lane, London EC2Y 9BU.

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require

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to be based in Singapore

SAI currently operates one ITEL AS/5 and two IBM 3031 computers. Several on-line and data base systems are being planned for implementation in the next few years. IBM software used includes ACP/IPARS, IMS-DB/DC, MVS, VM, CMS and APL.

To meet our requirements, we are looking for the following computer professionals:

	Requirements:
COMPUTER PROJECT MANAGERS	University/College degree with some years' data processing experience at a senior level.
DATA BASE ADMINISTRATORS SYSTEMS ANALYSTS SYSTEMS PROGRAMMERS COMPUTER TRAINING OFFICERS	University/College degree and some relevant data processing experience. For the position of Computer Training Officers, candidates with training experience will be preferred.

Salary will be commensurate with qualifications and experience. Successful applicants will be employed either on 3-year contracts or on our permanent establishment.

ATTRACTIVE FRINGE BENEFITS INCLUDE:

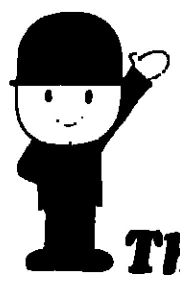
★ free travel once a year on company services and concessional travel on other occasions on company services or other carriers; and

★ free medical and dental treatment.

Applications with full details of age, education, experience, present and expected salaries and contract telephone numbers should be addressed to:

Management Services Administration Manager
Singapore Airlines Limited
8th Floor, 77 Robinson Road
SINGAPORE 0106
before 6th April, 1981

(4731)



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ICL experience with commercial applications?

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Senior Systems Analyst to £10,000 + car

Aged 28+ with at least 5 years' analysis experience including project/team leader responsibility. Knowledge of ICL systems essential.

Systems Analysts to £8,500

Aged ideally 25+ with 2-3 years' analyst experience in commercial applications, including ICL systems.

Our benefits include:

* 22 days' holiday * free lunches
* free car park * staff discount scheme

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Write or telephone for an application form, or send full career details to:
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Spillers Foods Limited, 1 Blagdon Road, New Malden,
Surrey KT3 4TB.
Tel: 01-949 6100.

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PLANT BREEDING INSTITUTE
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CAMBRIDGE CB2 2LQ

SCIENTIFIC OFFICER COMPUTER PROGRAMMER

A Scientific Officer is required to provide general assistance to staff in all computing aspects of their research work, and to develop new software for data capture and data processing on a PDP 11. The institute relies on terminal links to the Cambridge University IBM 370 for the majority of its computing requirements. A major enhancement of the University computing system is planned for 1982 and the officer will be expected to play an important part in exploiting the new facilities available. The officer will work within the Statistics Department which at present comprises three statisticians and one assistant.

Candidates should have an appropriate degree or HNC with good general knowledge of computer science. A knowledge of FORTRAN and some statistical experience desirable.

Starting salary will be according to age and experience on a scale rising from £4800 p.a. to £6480 p.a. Non-contributory pension scheme.

Applications with curriculum vitae and names and addresses of three referees should be submitted to the Establishment Officer not later than 31st March 1981.

Please quote reference STA/112.

(4721)

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Minerva (4589)

Computer Personnel

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The management Services Department consisting of O & M and Work Study, operations research and data processing divisions requires System Support staff at Senior and Systems Programmer level.

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- — DOS/VS and/or VSE Release2 — Assembler, MACRO and COBOL Coding
- — VM/370 Operations — VSAM and DL/1 Data Base Management
- — A CICS/VS background will be an added advantage

The department's workload is extremely interesting and varied, which will definitely broaden your experience. An excellent training programme, matched to your needs and potential, will equip you for higher calibre projects in a progressive environment.

Benefits include:

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Ms Sandy Cook
Anglo Charter International Services Limited,
40 Holborn Viaduct, London EC1P 1AJ
Quoting reference SCW20/81.

CDM

(4679)

WEST GLAMORGAN County Council

West Glamorgan Institute of Higher Education

Head of School of Mathematics and Computing/Director of Computer Services Unit (Principal Lecturer Grade)

Applications are invited for the above post in the Authority's service, to commence as soon as can be arranged.

Applicants should have relevant commercial/industrial and academic experience, including TEC/BEC and university/CNAA validation procedures, suitable qualifications in computing and/or Management Services and the ability to lead an academic team to degree and B.S.C. Part 11 levels. A postgraduate degree would be an advantage.

SALARY SCALE: £10,509-£13,245 (bar £11,712)
POST REF: HE5/1/1/81.

Application forms and further particulars of this post are available on receipt of a stamped addressed envelope, from the Principal, West Glamorgan Institute of Higher Education, Townhill Road, Townhill, Swansea SA2 0UT. The CLOSING DATE for the receipt of completed application forms is THURSDAY, 19th MARCH, 1981.

COMPUTER WEEKLY CLASSIFIED

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9 a.m.-6 p.m.

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MANAGEMENT & EXECUTIVE SELECTION

(4701)

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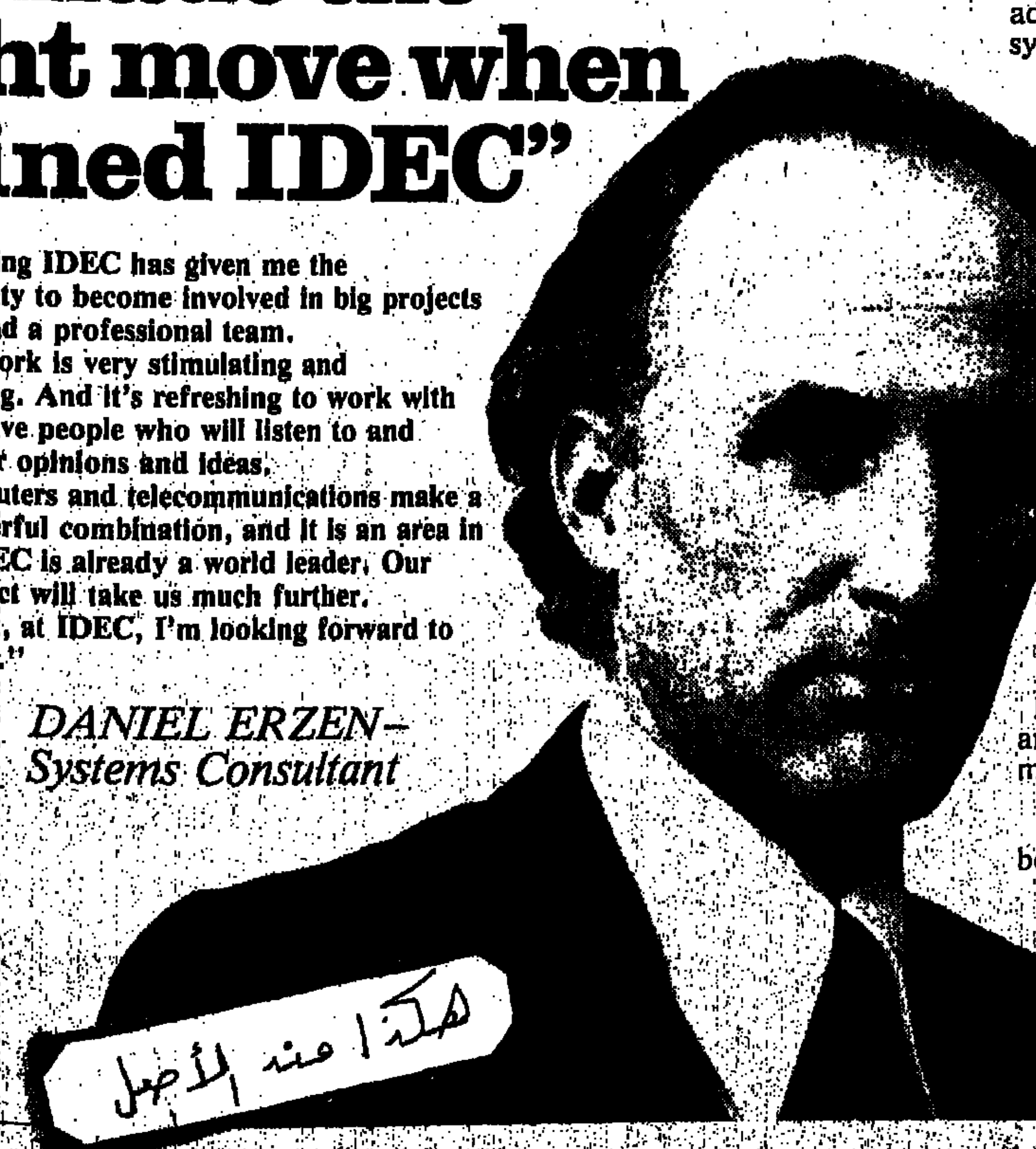
In fact, at IDEC, I'm looking forward to the future."

DANIEL ERZEN– Systems Consultant



As a development centre for ITT in Europe, IDEC is an established innovator in high level software for advanced microprocessor based communications systems.

Ours is a fast-moving organisation in a fast-moving industry. And that's why we're looking for experienced and ambitious Software Professionals at all levels to join our successful operation.

With IDEC, you'll become an important member of a talented project team working on a wide variety of challenging projects which will involve highly sophisticated and advanced microprocessor engineering, firmware, software and systems. In other words, you'll gain a broad-based experience in the shortest possible time.

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So if you're an experienced Software Professional looking to develop your abilities, further your career and reap the rewards your talent deserves, make the move to IDEC.

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Contact Sue Dowsett or Chris Turner at the address below to arrange an immediate interview. IDEC–ITT, Orchard House, Mutton Lane, Potters Bar, Herts. Telephone Potters Bar (0707) 51199.

ITT–IDEC ITT

Data Processing Professionals.

LONDON EC4

Our client is an export finance and marketing organisation with offices in major cities throughout the world and is a subsidiary of a major banking group.

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ANALYST PROGRAMMER

c £11,000

To assist in the development of new integrated new on-line systems while being responsible for the enhancement/maintenance of existing systems. It is envisaged that the successful candidate will have 5+ years d.p. experience coupled with a programming background.

PROGRAMMER

c £9,000

You will be working closely with the S.A. on the development of the above systems and this position therefore offers a talented programmer genuine opportunities to move into an analyst programming role. It is envisaged that the successful candidate will have 3 + years' programming experience — preferably in more than one language.

These positions carry the responsibility for projects from design through to implementation and, as such, offer excellent opportunities for career progression. Attractive company benefits are offered including L.V.s, pension scheme, and relocation expenses where applicable.

For further details please telephone immediately or write in confidence quoting reference number 53/81/CW.

(4748)

CRS

COMPUTER RECRUITMENT SPECIALISTS

18 BUCKINGHAM PALACE ROAD, LONDON SW1W 0QP. TELEPHONE 01-828 1384 TELEX 24891

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Customer Engineers

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If you have 2 + years' experience of computer equipment we can offer you full product training at our Crawley headquarters, then total responsibility for your own area.

Pay and conditions are what you would expect of a large, dynamic young company – attractive salaries commensurate with experience plus overtime, plus car, plus realistic expenses.

Your skills could be exactly those we need. Contact John Currey, Manager of our South-East Branch on 01-942 8900 Ext 248. Alternatively, write for an application form to: The Personnel Manager,

REDIFON COMPUTERS LIMITED

Kelvin Way, Crawley, West Sussex RH10 2LV.
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(4632)

AUSTRALIA

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Our Sydney and Melbourne Offices are in urgent need of high calibre DP personnel for both Contract and Permanent positions. The shortage of qualified personnel in Australia has created an employees' market and salary ranges are considerably higher than for the same period last year. For example, Contract Programmers are now earning between $A15 and $A20 per hour and Programmer/Analysts with a minimum of three years experience can expect salaries to start at $A18,000, working progressively up to $A26,000.

Any computer professionals planning a short working holiday in Australia or permanent residency are urged to contact our organisation at their earliest convenience providing a full resume of their work experience, together with details of arrival and preferred working location (Sydney or Melbourne). We guarantee an immediate reply with relevant information, including rates of pay and employment opportunities for someone with your particular background and experience.

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Communications Software

Southern Germany: Salary to £15K

Communications Engineers from Programmer/Analyst to Team Leader level are urgently required by one of Europe's leading suppliers of communications equipment. Software development teams, based in their R & D Headquarters, are currently engaged in the design and construction of an advanced telephony system based on Intel 8086 microprocessors. All applicants must possess at least two years' real-time software development experience on any leading mini or micro-computer and be fluent in one high-level problem-orientated language such as PASCAL, CORAL or RTL/2. For the more senior positions it is also necessary to be familiar with an Assembler language and be capable of supervising a small team of Programmers and Analysts. Initial interviews will be held in London and those who are successful will be invited to the Company's premises prior to offers of employment being made. Ref. L/10/A

Business Consultants

Central London: Salary to £14K

Your past experience in the Data Processing industry has probably given you the ability to identify and solve problems from both a business and technical point-of-view. If you also have good personal communication skills and a strong desire to join a successful and prestigious Management Consultancy, then our client, based in Central London will be very interested to hear from you. Particular requirements are for graduates aged 28 to 34, who can demonstrate extensive practical experience in the areas of Office Automation, Word Processing and Communication Networks. Respondents with specialist expertise in PRESTEL and VIDEOTEX applications are especially welcome. Ref. L/10/B

Technical & Commercial S/W

E.E.C.: Pkg. to £16K

Technical and Commercial Software Specialists are urgently sought by a leading Dutch Systems and Software House. Applicants with a commercial background will be required to have at least 3 years' programming experience in Assembler, Basic or PL/I on small business interactive systems. Of special interest will be candidates with exposure to established Structured Programming techniques. Technically-orientated applicants will be expected to possess expertise in Communications Networks, Message Switching or Process Control Systems Development. Ancillary benefits are excellent and successful applicants will be offered full relocation assistance. Ref. L/10/C

Software Support

W. Home Counties: Salary to £13K

A leading Total Systems Supplier requires additional Analyst/Programmers and Project Leaders to join either its Customer Support or Software Development teams. Suitable applicants will have good personal communication skills and the ability to identify and solve client problems. It is essential for all positions that you offer at least 12 months' experience of analysing commercial systems. Additionally, you should be fluent in Assembler, Basic + or COBOL and have recent exposure to mini or micro computers. Candidates who have actual or potential management abilities will of course be considered for the more senior positions. Ref. L/10/D

Process Control Programmers

N. Home Counties/EEC: Salary to £12K

Our client is one of the world leaders in the supply of Industrial Process Control Systems. Planned expansion for 1981 has produced vacancies for additional real-time Programmers to join teams engaged in the design and development of software from product planning to live running. Suitable applicants will have at least one year's experience in either Assembler, Fortran or Pascal in a mini-computer or micro-processor environment. Those who have worked with a manufacturer or who have exposure to Kent, Foxboro or Ferranti based systems will be of particular interest. Ref. L/10/E

Real-Time Programmers

Central London: Salary to £9K

Additional Programmers are urgently required to join the Software development team of a small but expanding Systems House based in Central London. The Company is currently engaged in the design, coding and testing of real-time software for U.K. and Overseas clients. Suitable applicants will have a degree in a numerate subject and at least two years' real-time programming experience in either FORTRAN, CORAL 66 or Assembler. If you have been exposed to mini computers, especially DEC's PDP range, HP 2100, Prime 500 or Honeywell Level 6, you will be of particular interest to our clients. Ref. L/10/F

Message Switching

Home Counties: Salaries to £13K

Senior Programmer/Designers are urgently required by a leading supplier of data and office communications equipment whose rapid planned expansion has led to a number of vacancies being created in their Software Development Department. Candidates should offer 3/5 years' Assembler Programming experience in communications and networking environments. Whilst there is a preference for candidates who have worked on PDP11 mini-computers or leading micro processors, particular hardware experience is not of paramount importance. Ref. L/10/G

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For all of these posts salaries are negotiable and should not be a problem for suitably qualified staff. Generous overseas allowances are paid where applicable.

If you are interested in these vacancies or feel that you have other experience that would be of value to an international Software House please write or call:

Alan Taylor
SPL International,
12/14 Windmill Street,
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To arrange an immediate and confidential interview, contact Dave Scarlett on 01-935 0671, or (evenings and weekends) on 01-540 2500.

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At present, our Management Services Department operates from a dual IBM 3033 installation, with more than 200 on-line terminals supported by IMS DB/DC; and it is projected to increase this number to 500 over the next five years.

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If you are interested in finding out more about these positions please write, enclosing a curriculum vitae, to:

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For more information telephone:
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TANGENT COMPUTER SERVICES
202/206 Fourth Street
Romford, Essex
Tel: Romford 760201

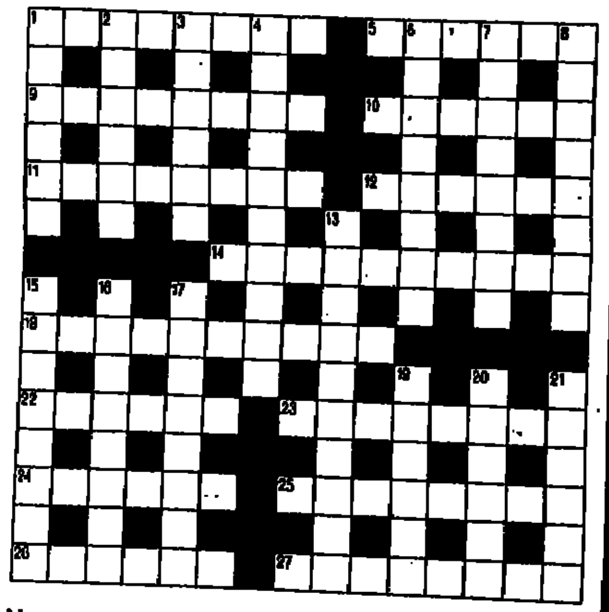
(4720)

CROSSWORD

Prize Crossword No 14

Compiled by Alec Robins

A prize of £10 will be awarded for the first correct entry opened. The second and third solutions opened will receive £5 each. Entries to Crossword Competition, Computer Weekly, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS, by first post Friday, March 13. Please use a ballpoint to complete the crossword, and include a telephone number at which you can be reached during the daytime.



Name...(Miss, Mrs, Ms, Mr)

Address..

....

Telephone..

I accept the rules and conditions of the Computer Weekly Crossword Competition.

Signed............................ Date...............................

ACROSS

1. A clergyman rejected by a large town for telling the truth (8)
5. Make holy Henry humble (6)
9. Two slices of meat for cooking quickly (4-4)
10. The officer, by the sound of it, is a nut (6)
11. Exaggerates ever so outrageously about the party (8)
12. Fail to find a lieutenant's first service book (6)
14. To tolerate a backward idiot, remain detached (5,5)
18. Fine actress, one with name, a high flier (4,6)
22. West kept in order with outlaw about — Robin Hood, perhaps? (6)
23. A vehicle, one reversing in quiet grassy plain (8)
24. Once again put down the Spanish in a sudden attack (6)
25. Dressing a youth covered in dirt (5-3)
26. Chaps with no leader sing out of tune and flag (6)
27. Dull southern reactionary agreement — it imposed duty on American colonies (5,3)

DOWN

1. Champion chucker-out losing his head (6)
2. Cross containing iron is covered on top (6)
3. A rotter infiltrating the intelligence agency, I'm chirpy (6)
4. Drunk takes bet on for an expensive dish (1-4,5)
6. A New Yorker, perhaps, a fellow eating cooked rice (8)
7. Protracted stay for one in the field (4-4)
8. If I dwell in the rough, there'll be lions, tigers, etc (8)
13. World authority excuses the worker — it's disagreeable (10)
15. Great rally causes crush — a tedious affair — over England's capital (8)
16. Would-be polymaths observed in hillocks around West Africa (4-4)
17. Questionably sane ruler acting furtively (8)
19. Master, unfortunately, turned up, bringing greeting (6)
20. Silky material one's seen on fashion artist (6)
21. Tea's permitted in this summer hut (6)

RULES AND CONDITIONS

1. Each competitor may submit no more than one entry.
2. The competition is open to all readers of Computer Weekly with the exception of the staff of IPC Business Press Ltd, any printers employed by them or the near relatives of any such staff.
3. The solution of each puzzle will normally be published in the issue three weeks after the puzzle has been published.
4. Winners will receive their prizes during the month following the competition.
5. The decision of the editor on the interpretation of the rules and conditions and on all matters shall be final. No correspondence will be entered into.

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(4534)

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Applications are invited for the post of Systems Programmer in the Operating Systems team at SWURCC. SWURCC is situated in the congenial surroundings of Bath University campus and is the regional computer centre for the South-West Universities Computer Network.

Operating Systems is a small team responsible for maintaining and developing the VME/B operating system on a powerful ICL 2980. Development projects often involve programming in S3 (an Algol 68-like language) and immediate developments include implementing the latest version of VME/B (6.10), modification of a locally designed high-level scheduler and improvements in communications software.

This is a challenging post requiring a self-motivating, quick-learning individual. Experience of VME/B (or another large operating system) and of designing and developing systems software would be an advantage. Training will be given where necessary.

Salary in the range £6,505 - £9,595 (under review).

Application forms and further particulars may be obtained from the Personnel Office, University of Bath, Bath BA2 7AY (0225-61244), quoting reference 81/23. Closing date 20 March, 1981.

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SALES BIT

Professional Credibility — 3

Creating the right kind of image in the buyer's mind

FOR the last two weeks this column has discussed the various factors involved in the establishment of professional credibility within the sales organisation. This week concludes the series by looking at further elements of the process.

Buyers are interested only in doing business with people whom they feel really understand their problems. This usually boils down to two factors: applications knowledge and listening. If the salesman cannot convince the buyer in this respect, he is unlikely to reach first base; whereas one who can establish that he has a real appreciation of the situation, or better still by experience and careful listening can identify a problem the buyer has not appreciated, is halfway to completing the sale.

Once again applications fluency and product knowledge are important, but even more essential is the ability to think creatively, conceptual selling if you like. Whether one is in the bespoke business or selling a solution that is looking for a problem, the ability to work with the client to identify the best solution to the original problem, or even the development of ideas to a broader platform, can be a major component in the establishment of professional credibility.

There can be no argument that one of the best ways to destroy professional credibility is lack of knowledge of one's own products. On the other hand, fluency in one's own portfolio, and competitive products can do much to create the right kind of image in the buyer's mind.

Once this has been established, the buyer may even grow to depend on the salesman as a source of information for his own purposes. That's when you are really established!

An effective questioning technique and with it the ability to identify unstated or even unknown needs and desires demands a high level of sales sensitivity, concentration, attention and experience. To have this capability is to have unquestionable professional credibility.

Knowing how the company mechanism works and what is happening at any point in time within the political hierachy is essential for both the establishment and maintenance of professional credibility. It is so easy to say or do the wrong thing at the wrong time, and find oneself out in the street with a negative professional status. Politics is a minefield; tread with care!

The market image and viability of a company can have a significant bearing on the level of professional credibility that its salespeople can achieve. A salesman can make every effort in the world to put across a good impression, but if his employer has a questionable image, or more often and equally negative, no image at all, then his chances of success are greatly reduced.

This problem can be overcome to a significant degree by starting the sales call with the company story declaring its history, philosophy and products, as well as financial viability. Good quality sales literature greatly assists a sale, as do reference clients who are relevant in terms of industry, application and location.

Good Press relations, while usually out of the salesman's control, usually offers high return for low investment.

Clearly, there are many facets to professional credibility and each sale is likely to demand different considerations and emphasis. However, there can be no escape from the basic theme, only variations on it. Professional credibility is the key to the successful conclusion of the sales negotiation.

Without it the evangelical salesman may get a conversion but he will never gain absolute commitment (eg, that unspoken statement: "You have persuaded me that I should have such a product, but I intend to get one from a salesman and company I know I can rely on").

The establishment of this level of rapport is seldom an overnight affair. It is usually a hard-earned process involving many people and many meetings over many weeks, months, even years. Yet, it can be lost in a matter of seconds by a single error of judgment.

Alan Williams

COURSES

■ Widespread introduction of coloured visual display devices has presented many industrial designers and engineers with new problems. The University of Surrey has organised a course Colour in Visual Displays to help with the solutions. It will be held on March 26-27 at the University in Guildford. It will cover basic colour phenomena, colour measurement and specification, the visibility and legibility of displays under various viewing conditions and the use of multi-colour displays. The fee is £110. Further information from Mrs Pollard at the University, telephone (0483) 71281 ext 457.

■ A WORKSHOP concentrating on practical design and implementation of computer-assisted training will be held at the Gloucester Hotel, London, on April 30-May 1 and June 4-5. The course is organised by Mills and Allen Communications in collaboration with the training services division of MSC. Further information from Brigitte Burnett, Mills and Allen, 1-4 Langley Court, Long Acre, London WC2. Tel: 01-240 1307.

PUZZLE ANSWER

NO integer with more than two digits can fit the bill, because even the smallest logical possibility — 102 — would require the addition of 99 in the two steps. But six digits just cannot sum to 99.

So the field of search is narrowed considerably, and can be further reduced by spotting that (a) X and Z cannot differ by more than about 30, and (b) that the first digit of X is obviously lower than the second digit. In the event, further cut-and-try reveals that 69 is the only other solution.